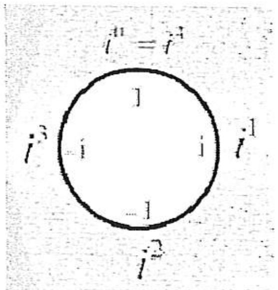
UNIT 1 REVIEW – POLYNOMIALS & COMPLEX NUMBERS



Examples:

1. Express $(1 - i)^3$ in $\boxed{a + bi \text{ form}}$.

Type in calculator!

$-2-2i$

2. Given i is the imaginary unit, express $(2 - yi)^2$ in $\boxed{\text{simplest form.}}$

$(2-yi)(2-yi) = 4 - 2yi - 2yi + y^2 i^2$

$4 - 4yi - y^2$

$* i^2 = -1 *$

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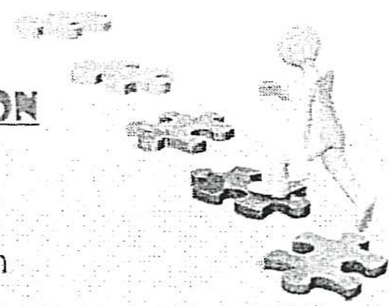
HOW TO SOLVE A RADICAL EQUATION



1) Isolate the radical
2) Square both sides of the equation
3) Solve for all values of x
4) Check both answers and name any **extraneous roots**
5) State the solution set

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Solve for x

1. Determine the $\boxed{\text{solutions}}$ set to $(\sqrt{56-x})^2 = (x)^2$

$56 - x = x^2$

$0 = x^2 + x - 56$

$0 = (x+8)(x-7)$

$x = -8 \quad x = 7$

$\{7\}$

Check for extraneous roots!

Factor
Formula
CTS
Graph

Ways To Solve a Quad. Eq.

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2. Determine the $\boxed{\text{solutions}}$ set to $s = \sqrt{t} - 2t + 6$ when s = 0.

$0 = \sqrt{t} - 2t + 6$

$(2t-6)^2 = (\sqrt{t})^2$

$(2t-6)(2t-6) = t$

$4t^2 - 24t + 36 = t$

$4t^2 - 25t + 36 = 0$

$x = \dfrac{25 \pm \sqrt{(-25)^2 - 4(4)(36)}}{2(4)} = \dfrac{25 \pm 7}{8}$

$\dfrac{25+7}{8} = 4$

$\dfrac{25-7}{8} = 2.25$

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$\{4\}$

UNIT 2 REVIEW – QUADRATICS

Types of Factoring:

- GCF
- Difference of Two Squares
- Trinomial (regular & grouping)

Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Standard Form: $y = ax^2 + bx + c$

Completing the Square

half of b and square it

Nature of Roots:

determined by discriminant $b^2 - 4ac$

Vertex Form: $y = \frac{1}{4p}(x - h)^2 + k$

where p = distance from focus to vertex and vertex to directrix, and (h, k) represents the vertex

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Examples:

When you see this phrase, factor (at least) 2 times!

1. Factor completely: $m^5 + m^3 - 6m$

$m(m^4 + m^2 - 6)$

$m(m^2 + 3)(m^2 - 2)$

Use Quad Form.

2. Determine all solutions to $2x^2 + 3x + 2 = 0$ in simplest radical form.

$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(2)}}{2(2)}$

$x = \frac{-3 \pm \sqrt{-7}}{4} = \frac{-3 \pm i\sqrt{7}}{4}$

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3. The $\boxed{\text{directrix}}$ of the parabola $12(y + 3) = (x - 4)^2$ has the equation $\boxed{y = 6.}$ Find the $\boxed{\text{coordinates of the focus}}$ of the parabola.

$y+3 = \frac{1}{12}(x-4)^2$

$y = \frac{1}{12}(x-4)^2 - 3$

$\frac{1}{4p} = \frac{1}{12}$

$p = 3$

Vertex $(4, -3)$

Focus $(4, 0)$

4. Solve for all $\boxed{\text{zeros}}$ of $f(x) = x^4 - 4x^3 - 9x^2 + 36x$.

$x^4 - 4x^3 - 9x^2 + 36x = 0$

*4 roots – real? Imaginary?

*Check on calculator

Factor By Grouping → $x^3(x-4) - 9x(x-4) = 0$

$(x^3 - 9x)(x-4) = 0$

GCF → $x(x^2-9)(x-4) = 0$

DOTS → $x(x+3)(x-3)(x-4) = 0$

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$x = 0 \quad x = -3 \quad x = 3 \quad x = 4$

$\{0, \pm 3, 4\}$

5. The equation $\frac{4x^2}{4} - \frac{24x}{4} + \frac{4y^2}{4} + \frac{72y}{4} = \frac{76}{4}$ is equivalent to:

*Divide by 4

A. $4(x - 3)^2 + 4(y + 9)^2 = 76$

B. $4(x - 3)^2 + 4(y + 9)^2 = 121$

C. $4(x - 3)^2 + 4(y + 9)^2 = 166$

D. $4(x - 3)^2 + 4(y + 9)^2 = 436$

CTS Twice ↓

$x^2 - 6x + \_\_ + y^2 + 18y \_\_ = 19$

$x^2 - 6x + 9 + y^2 + 18y + 81 = 19 + 9 + 81$

$(x-3)^2 + (y+9)^2 = 109$

*multiply by 4

$4(x-3)^2 + (y+9)^2 = 436$

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Units 1 & 2 Homework

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UNIT 3 REVIEW – SYSTEMS

The solution(s) to a system of equations is where the graphs intersect.

2 x 2 Systems

Solution: (x,y)

Look for multiple solutions (more than 1 intersection point)

Can be solved algebraically or graphically

How to find an intersection point on your calculator: 2nd TRACE 5

3 x 3 Systems

Solution: (x,y,z)

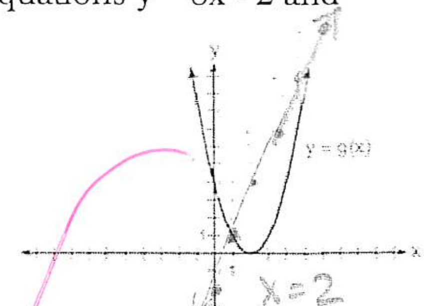
Look for a single solution

Only solved *algebraically* (using elimination method)

May 3-10:34 AM

EXAMPLES

1. What is the solution to the system of equations $y = 3x - 2$ and $y = g(x)$ is defined by the function below.



Solutions (1, 1) (6, 16)

$x=2$
even root
$x=2 \quad x=2$
$(x-2)(x-2) = g(x)$
$x^2-4x+4 = g(x)$

Find the equation of the parabola & Solve the system graphically!

YOU'VE GOT WHAT IT TAKES

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2. Solve the following system of equations algebraically:

* get rid of a

$4a + 5b - 6c = 2$

$-3a - 2b + 7c = -15$

$\boxed{-a + 4b + 2c = -13}$

$\{-3, -2, -4\}$

YOU'VE GOT WHAT IT TAKES

* Double Elimination!

$4(-a+4b+2c=-13)$
$4a+5b-6c=2$

$-4a+16b+8c=-52$
$4a+5b-6c=2$

$21b+2c=-50$

$-3(-a+4b+2c=-13)$
$-3a-2b+7c=-15$

$3a-12b-6c=39$
$-3a-2b+7c=-15$

$-14b+c=24$

$21b+2c=-50$
$-2(-14b+c=24)$

$21b+2c=-50$
$28b-2c=-48$

$49b=-98$

$\boxed{b=-2}$

$-14(-2)+c=24$
$28+c=24$
$\boxed{c=-4}$

$-a+4(-2)+2(-4)=-13$
$-a-8-8=-13$
$-a-16=-13$

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where do the circle & line intersect?

3. Solve the system of equations shown algebraically:

$(x - 3)^2 + (y + 2)^2 = 16$

$2x + 2y = 10$

$2y = 10 - 2x$

$y = \boxed{5 - x}$

Solve linear for y & substitute into circle equation.

$(x-3)^2 + (5-x+2)^2 = 16$

$(x-3)(x-3) + (7-x)^2 = 16$

$x^2 - 6x + 9 + 49 - 14x + x^2 = 16$

$2x^2 - 20x + 58 = 16$

$\frac{2x^2 - 20x + 42}{2} = \frac{0}{2}$

$x^2 - 10x + 21 = 0$

$(x-3)(x-7) = 0$

$x = 3$ $\quad$ $x = 7$

$y = 5 - 3$ $\quad$ $y = 5 - 7$

$y = 2$ $\quad$ $y = -2$

$\boxed{(3, 2) \quad (7, -2)}$

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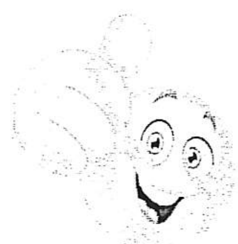
UNIT 4 REVIEW – RATIONALS

Adding/Subtracting – Find common denominators

Synthetic Division (uses the root) is a shortcut for **Long Division (uses the whole polynomial)** that can *only* be used when the leading coefficient of the binomial you divide by is 1

If something is a **factor** of a polynomial you can check by (remember if it is short answer you need to be able to show work):

- Synthetic division will have no remainder
- Long Division will have no remainder
- Evaluating the function at the root will give you 0
- Look for a root on the graph (where it crosses the x-axis)
- Look in the table for the x-value when y=0



Rational Root Theorem - potential roots of a polynomial are found by finding all the positive and negative values of the factors of the last term divided by the factors of the first term

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If you are asked to prove something, only manipulate one side of the equation!

1. Algebraically prove that $\frac{x^3+9}{x^3+8} = 1 + \frac{1}{x^3+8}$ where $x \neq -2$.

$$\frac{x^3+9}{x^3+8} = \frac{x^3+8}{x^3+8} + \frac{1}{x^3+8}$$

$$\frac{x^3+9}{x^3+8} = \frac{x^3+9}{x^3+8} \checkmark$$

* your last line must be what you were trying to prove!

2. Given f(x) = 3x² + 7x - 20 and g(x) = x - 2, state the quotient and the remainder of $\frac{f(x)}{g(x)}$ in the form $q(x) + \frac{r(x)}{g(x)}$.

$$\begin{array}{r|rrr} 2 & 3 & 7 & -20 \\ & \downarrow & 6 & 26 \\ \hline & 3 & 13 & 6 \end{array}$$

$$\boxed{3x + 13 + \frac{6}{x-2}}$$

* x-2 is NOT a factor of $3x^2+7x-20$ because the remainder $\neq 0$!

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Units 3 & 4 HW

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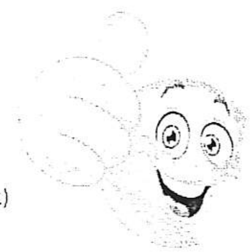
UNIT 5 REVIEW – FUNCTIONS

Helpful Information:



Function – x-values can NOT repeat (vertical line test)

Domain – x-values   **Range**- y-values

One-To-One – function in which y-values can NOT repeat (horizontal line test)

Inverse – $f^{-1}(x)$ – switch x and y, then solve for y

Composition – $f(g(x)) = (f \circ g)(x)$ ($f(f^{-1}(x))$ used to prove inverses)

Transformations – (remember x changes opposite)

	Reflection	Dilations	Translations
Changes on x	$f(-x)$	$f(a \cdot x)$	$f(x+a)$
Changes on y	$-f(x)$	$a \cdot f(x)$	$f(x)+a$

symmetric about the y-axis

Even Functions – symmetric about the ~~x~~ y-axis ($f(x) = f(-x)$)   **Example: $y = \cos x$

Odd Functions – symmetric about the origin (180º rotation) ($-f(x) = f(-x)$)   **Example: $y = \sin x$

→ flip function upside down!
It should be the same function!

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TRY THIS!

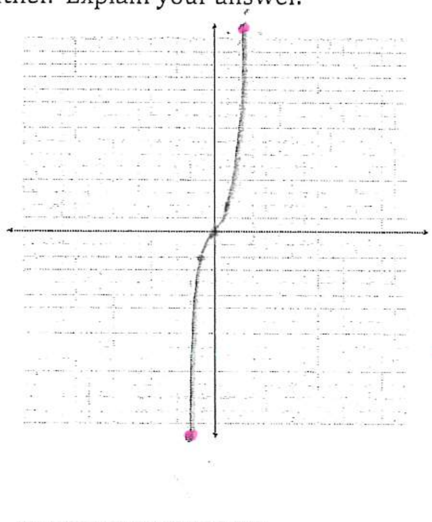
1. If $f^{-1}(x) = 4x - 3$, find $f(x)$.

$y = 4x - 3$
$x = 4y - 3$
$\frac{x+3}{4} = y$

$\boxed{f(x) = \frac{x+3}{4}}$

2. Sketch a graph of $f(x) = 2x^3$ on $\boxed{[-2, 2]}$ Domain. Determine if the function is even, odd, or neither. Explain your answer.

x	y
-2	-16
-1	-2
0	0
1	2
2	16



$f(x) = 2x^3$
$f(-x) = 2(-x)^3$
$= -2x^3$

Even → same
NO

Odd → Opposite
YES

f(x) is Odd because
$f(-x) = -f(x)$

May 3-2:00 PM

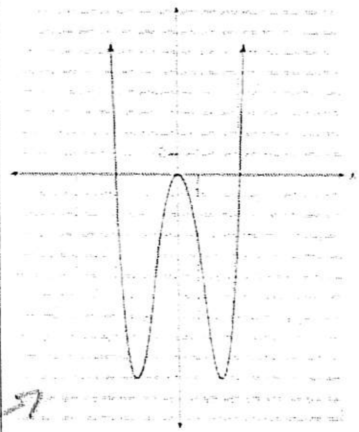
TRY THIS!

3. Functions f, g, and h are given below. Which statement is true about functions f, g, and h?

$f(x) = \sin(2x)$

$g(x) = f(x) + 1$ $= \sin(2x) + 1$

$h(x)$ is the graph shown



Even (reflect over y-axis)

A) f and g are odd, h is even

B) f and g are odd, h is odd

C) f is odd, g is neither, and h is even

D) f is even, g is neither, and h is odd

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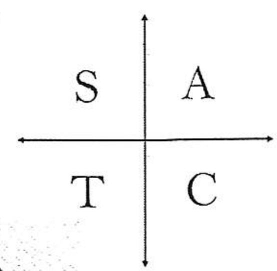
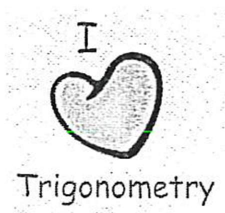
UNIT 6 REVIEW – TRIGONOMETRY

- Angles have their initial side on the x axis (between Q I and Q IV). We move COUNTER CLOCKWISE to draw angles (follows the path of Q I, II, III, and IV).
- Reference angles are always drawn TO the x-axis.
- On the unit circle, $(x, y) \to (\cos\theta, \sin\theta)$
- Trig functions are positive in specific quadrants
- Trig Identities & Pythagorean Identities:
  - $\sin^2 x + \cos^2 x = 1$
  - $\tan x = \frac{\sin x}{\cos x}$
  - $\csc x = \frac{1}{\sin x}$
  - $\sec x = \frac{1}{\cos x}$
  - $\cot x = \frac{1}{\tan x} = \frac{\cos x}{\sin x}$

Reciprocal Trig Functions





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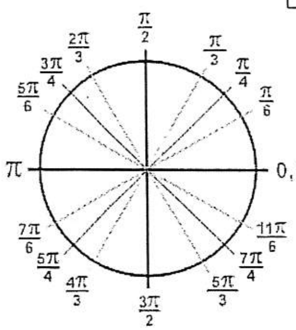
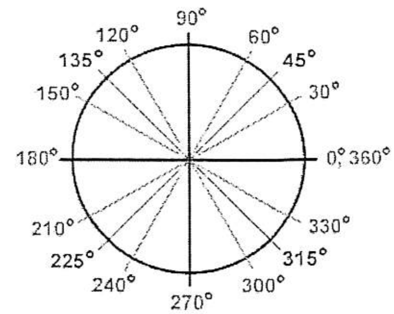
π radians = $180°$

Reference Angles are always ACUTE!

	0	30	45	60	90
sin Θ	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos Θ	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan Θ	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	DNE





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Examples:

* use a reference triangle!

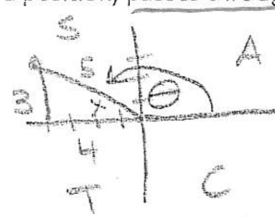
1. If the terminal side of angle θ, in standard position, passes through point $(-4, 3)$, what is the numerical value of $\sin\theta$?

   1) $\frac{3}{5}$

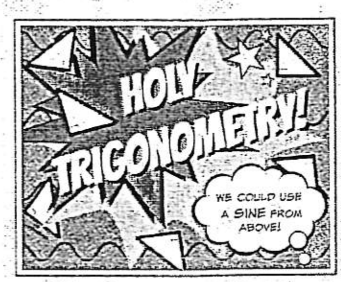
   2) $\frac{4}{5}$

   3) $-\frac{3}{5}$

   4) $-\frac{4}{5}$



$\sin\theta = \sin x = \frac{3}{5}$



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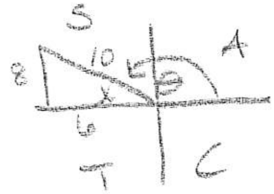
2. A circle centered at the origin has a radius of 10 units. The terminal side of an angle, θ, intercepts the circle in Quadrant II at point C. The y-coordinate of point C is 8. What is the value of $\cos\theta$?

1) $-\frac{3}{5}$

2) $-\frac{3}{4}$

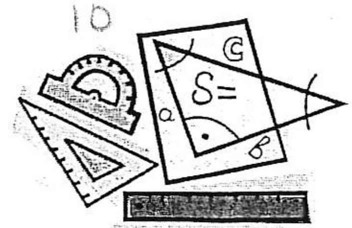
3) $\frac{3}{5}$

4) $\frac{4}{5}$



$\cos\theta = -\cos x$

$= -\frac{6}{10}$



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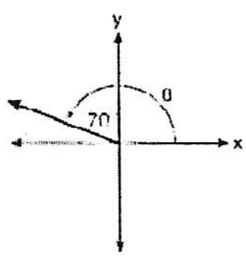
clockwise

3. In which graph is θ coterminal with an angle of $-70°$?

(1)



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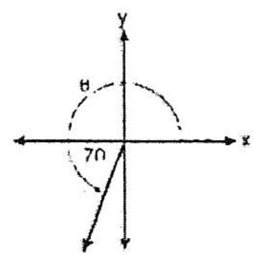
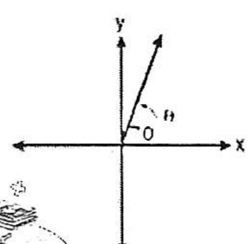


(2)



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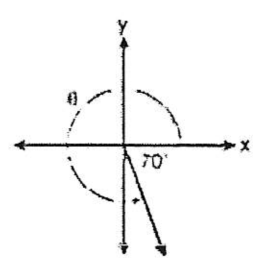

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4. Jordan and Ebony are simplifying $\dfrac{\sin^2\theta}{\cos^2\theta+\sin^2\theta}$. Is either correct? Explain your reasoning.

Jordan	Ebony
$\dfrac{\sin^2\theta}{\cos^2\theta+\sin^2\theta}$	$\dfrac{\sin^2\theta}{\cos^2\theta+\sin^2\theta}$
$=\dfrac{\sin^2\theta}{\cos^2\theta}+\dfrac{\sin^2\theta}{\sin^2\theta}$	$=\dfrac{\sin^2\theta}{1}$
$=\tan^2\theta+1$	$=\sin^2\theta$
$=\sec^2\theta$	

Pyth. Id = 1

Incorrect! Can break up a binomial denominator

Ebony is correct

Jordan made a mistake because she broke up a binomial denominator

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5. A shadow moves around a sundial 15º every hour.

a. After how many hours is the angle of rotation of the shadow $\frac{8\pi}{5}$ radians?

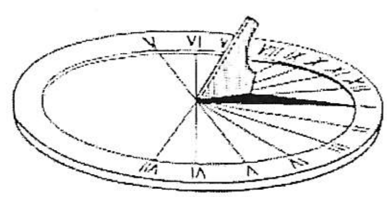
$\frac{8\pi}{5}$ rad $= \frac{8(180)}{5} = 288°$

$\frac{288°}{15°} = 19.2$

After 19 hours

b. What is the angle of rotation in radians after 5 hours?

$\boxed{15(5) = 75°}$



$\frac{180°}{\pi} = \frac{75}{x}$ OR

$180x = 75\pi$

$\boxed{x = \frac{5\pi}{12} \text{ radians}}$

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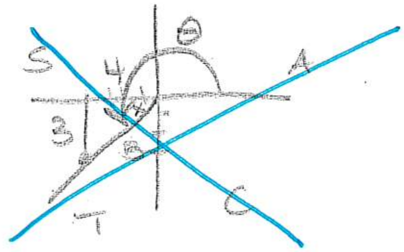
If the terminal side of angle θ, in standard position, passes through point $(-4, 3)$, what is the numerical value of $\sin\theta$?

1) $\frac{3}{5}$

2) $\frac{4}{5}$

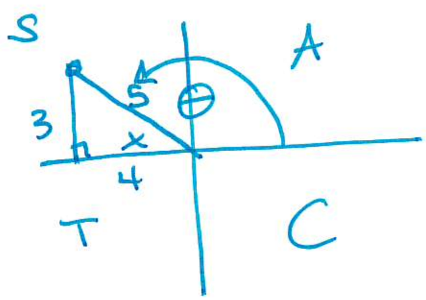
3) $-\frac{3}{5}$

4) $-\frac{4}{5}$



$\sin\theta = +\sin x$

$= +\frac{3}{5}$



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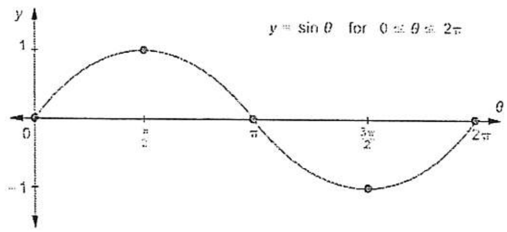
Units 5 & 6 Homework

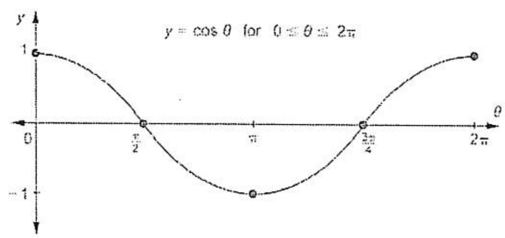
May 4-7:55 AM

UNIT 7 REVIEW – TRIG GRAPHS

$y = \sin x$



$y = \cos x$



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$$y = A\sin\big(B(x + C)\big) + D$$

- sin can be replaced with cos
- A = amplitude (distance from midline to max)
- B = frequency (# cycles in a 2π interval)
- C = horizontal shift (shifts opposite)
- D = vertical shift (midline)

freq $= \dfrac{2\pi}{\text{period}}$

period $= \dfrac{2\pi}{\text{frequency}}$

Amplitude is always positive! But the function can be negative (Reflection over the x-axis)

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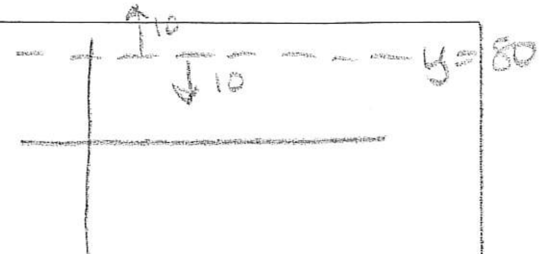


amp = 10

1. The Ferris wheel at the landmark Navy Pier in Chicago takes 7 minutes to make one full rotation. The height, H, in feet, above the ground of one of the six-person cars can be modeled by $H(t) = 10\sin\left(\frac{2\pi}{7}(t-1.75)\right) + 80$, where t is time, in minutes. Using $H(t)$ for one full rotation, this car's minimum height, in feet, is

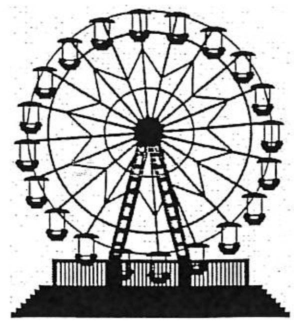
midline (VS)

1) 150

2) 70

3) 10

4) 0



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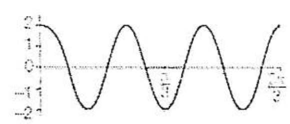
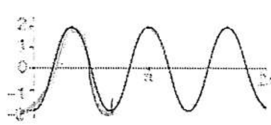
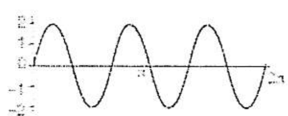
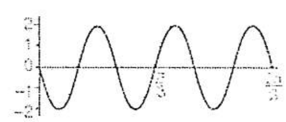
2. Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?

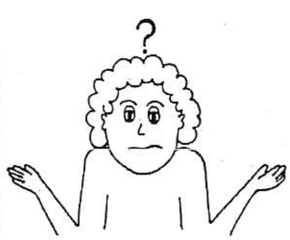
length of 1 full cycle

1) 

3) 

2) 

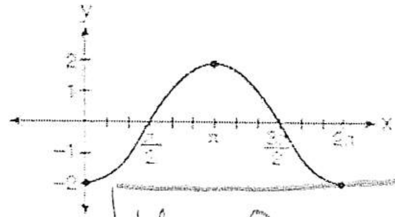
4) 



May 5-12:45 PM

period= length of 1 full cycle!

3. The accompanying graph shows a trigonometric function. State an equation of this function.

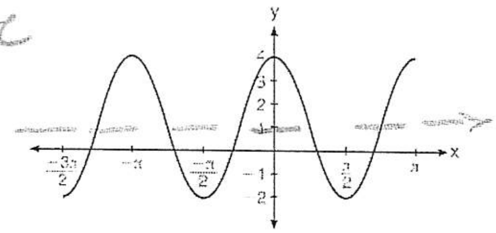


−cos curve
$a=2$
per $=2\pi$
freq $=1$

$\boxed{y=-2\cos x}$

4. The periodic graph below can be represented by the trigonometric equation $y = a\cos bx + c$ where a, b, and c are real numbers.

+cos curve



$\boxed{C=1}$ (midline)

$\boxed{a=3}$ (dist from midline to max!)

freq $=\frac{2\pi}{per}=\frac{2\pi}{\pi}=\boxed{2=b}$

State the values of a, b, and c, and write an equation for the graph.

$y=+3\cos(2x)+1$

May 5-12:45 PM

5. On the axes below, graph *one* cycle of a cosine function with amplitude 3, period $\frac{\pi}{2}$, midline $y=-1$, and passing through the point $(0, 2)$.

per $=\frac{2\pi}{freq}$

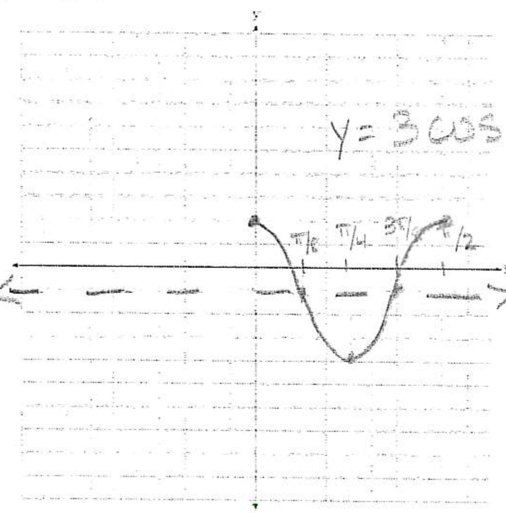
freq $=\frac{2\pi}{per}$

$=\frac{2\pi}{\pi/2}=4$

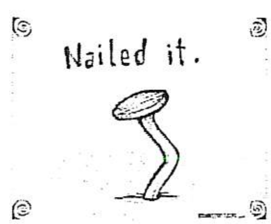
Interval $=\frac{per}{4}$

$=\frac{\pi/2}{4}=\pi/8$

$y=3\cos(4x)-1$



$y=-1$



May 5-12:45 PM

UNIT 9 REVIEW – REGRESSIONS, SEQUENCES & SERIES

Sequences & Series:

- formulas on reference sheet
- adding (subtracting) = arithmetic
- multiplying/dividing = geometric
- Sigma: Alpha Window

Regressions:

- Stat Diagnostics ON
- Use Stat button to enter lists
- Stat > Calc for regressions
  - > Only choose options that say reg for regression
- r = correlation (always from -1 to 1)

May 3-1:57 PM

1. The population of Jamesburg for the years 2010-2013, respectively, was reported as follows:

250,000 250,937 251,878 252,822

How can this sequence be recursively modeled?

exp. / geo

1) $j_n = 250,000(1.00375)^{n-1}$

2) $j_n = 250,000 + 937^{(n-1)}$

3) $j_1 = 250,000$
$j_n = 1.00375 j_{n-1}$

4) $j_1 = 250,000$
$j_n = j_{n-1} + 937$

2. Alexa earns \$33,000 in her first year of teaching and earns a 4% increase in each successive year. Write a geometric series formula, S_n, for Alexa's total earnings over *n* years. Use this formula to find Alexa's total earnings for her first 15 years of teaching, to the *nearest cent.*

$$S_n = \frac{a_1 - a_1 r^n}{1-r} = \frac{33000 - 33000(1.04)^n}{1-1.04}$$

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$S_{15} = \$660778.39$

example

3. Which function shown below has a greater average rate of change on the interval $[-2, 4]$? Justify your answer.

x	f(x)
−4	0.3125
−3	0.625
−2	1.25
−1	2.5
0	5
1	10
2	20
3	40
4	80
5	160
6	320

$g(x) = 4x^3 - 5x^2 + 3$

f(x)

$AROC = \frac{80 - 1.25}{4 - -2} = \frac{78.75}{6} = 13.125$

g(x)

$AROC = \frac{g(4) - g(-2)}{4 - -2} = \frac{179 + 49}{6} = \frac{228}{6} = 38$

$g(4) = 179$

$g(-2) = -49$

$\boxed{g(x)}$

May 10-12:30 PM

Units 7 & 9 Homework

May 4-7:57 AM

UNIT 8 REVIEW – EXPOENENTS & LOGS

Helpful Tips

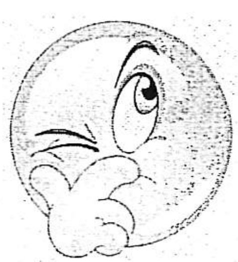
RULE TYPE	RULE
Multiplication	$x^{a} \cdot x^{b} = x^{a \cdot b}$
Division	$\dfrac{x^{a}}{x^{b}} = x^{a-b}$
Zero Power	$x^{0} = 1$
Power to a Power	$(x^{a})^{b} = x^{a \cdot b}$
Power of a Product	$(xy)^{a} = x^{a} \cdot y^{a}$
Power of a Quotient	$\left(\dfrac{x}{y}\right)^{a} = \dfrac{x^{a}}{y^{a}}$
Negative Exponents	$x^{-a} = \dfrac{1}{x^{a}}$
Fractional Exponents	$x^{\left(\frac{a}{b}\right)} = \sqrt[b]{x^{a}}$

May 3-1:57 PM

Exponential Growth & Decay

Continuous Growth $A = Pe^{rt}$

Interval Growth/Decay $A = P\left(1 \pm \frac{r}{n}\right)^{nt}$



$\log_{base} number = x \leftrightarrow base^{x} = number$

Base stays the same, everything else switches

$\ln x = \log_{e} x$ $\qquad$ $\log x = \log_{10} x$

If $b^{x} = b^{y}$, then x=y.

If $\log_{b} x = \log_{b} y$, then x=y.

May 8-10:37 AM

1. Which function represents exponential decay?

1) $y = 2^{0.3t}$

2) $y = 1.2^{3t}$

3) $y = \left(\frac{1}{2}\right)^{-t}$

4) $y = 5^{-t}$

* Type in calculator

2. What is the inverse of the function $y = \log_3 x$?

1) $y = x^3$

2) $y = \log_x 3$

3) $y = 3^x$

4) $x = 3^y$

$X = \log_3 y$

$3^x = y$

$\log_B A = E$

May 4-7:56 AM

* this was a Part IV Question!

$n = 5(12) = 60$

3. Using the formula below, determine the monthly payment on a 5-year car loan with a monthly percentage rate of 0.625% for a car with an original cost of \$21,000 and a \$1000 down payment, to the *nearest cent*.

$$P_n = PMT\left(\frac{1-(1+i)^{-n}}{i}\right)$$

$i = .00625$

$P_n = 20000$

P_n = present amount borrowed

n = number of monthly pay periods

PMT = monthly payment

i = interest rate per month

The affordable monthly payment is \$300 for the same time period. Determine an appropriate down payment, to the *nearest dollar*.

$20000 = PMT\left(\frac{1-(1+.00625)^{-60}}{.00625}\right)$

$400.758\ldots = PMT$

$\$400.76 = PMT$

$PMT = 300$

$21000 - x = 300\left(\frac{1-(1+.00625)^{-60}}{.00625}\right)$

$-x = -6028.407\ldots$

$x = \$6028$

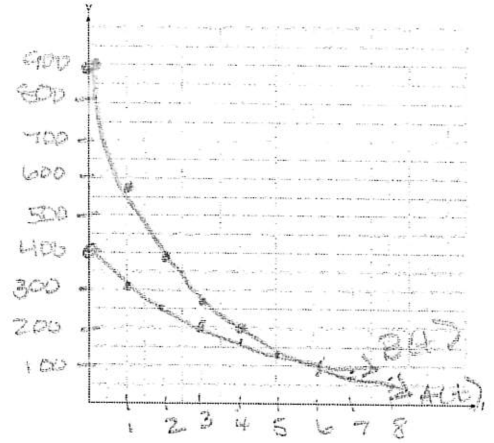
May 8-10:45 AM

4. Drugs break down in the human body at different rates and therefore must be prescribed by doctors carefully to prevent complications, such as overdosing. The breakdown of a drug is represented by the function $N(t) = N_0(e)^{-rt}$, where $N(t)$ is the amount left in the body, N_0 is the initial dosage, r is the decay rate, and t is time in hours. Patient A, $A(t)$, is given 800 milligrams of a drug with a decay rate of 0.347. Patient B, $B(t)$, is given 400 milligrams of another drug with a decay rate of 0.231.

Write two functions, $A(t)$ and $B(t)$, to represent the breakdown of the respective drug given to each patient. Graph each function on the set of axes below.

$A(t) = 800e^{-.347t}$

$B(t) = 400e^{-.231t}$



To the *nearest hour*, t, when does the amount of the given drug remaining in patient B begin to exceed the amount of the given drug remaining in patient A?

$t = 6$

May 8-10:45 AM

The doctor will allow patient A to take another 800 milligram dose of the drug once only 15% of the original dose is left in the body. Determine, to the *nearest tenth of an hour*, how long patient A will have to wait to take another 800 milligram dose of the drug.

$$.15(800) = 800e^{-.347t}$$
$$120 = 800e^{-.347t}$$
$$.15 = e^{-.347t}$$
$$\ln(.15) = \ln(e^{-.347t})$$
$$\ln(.15) = -.347t$$
$$5.467\ldots = t$$
$$\boxed{5.5 \text{ hrs}}$$

May 4-7:56 AM

Unit 8 Homework

May 4-7:58 AM

UNIT 10 REVIEW – PROBABILITY

Helpful Information:

- Probability of A given B $P(A|B) = \frac{P(A \cap B)}{P(B)}$
- Proving Independence $P(A|B) = P(A)$
- Mutually Exclusive Events $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\frac{P(A \cap B)}{P(B)} = P(A)$

OR

$P(A \cap B) = P(A) \cdot P(B)$

This formula will be used to find the probability of "OR" as well as the prob. of "AND"

May 3-1:57 PM

EXAMPLES

1. Sean's team has a baseball game tomorrow. He pitches 50% of the games. There is a 40% chance of rain during the game tomorrow. If the probability that it rains given that Sean pitches is 40%, it can be concluded that these two events are

1) independent
2) dependent
3) mutually exclusive
4) complements

$P(P) = .5$
$P(R) = .4$
$P(R|P) = .4$
Independent: $P(R|P) = P(R)$

2. A suburban high school has a population of 1376 students. The number of students who participate in sports is 649. The number of students who participate in music is 433. If the probability that a student participates in either sports or music is $\frac{974}{1376}$, what is the probability that a student participates in both sports and music?

$P(S \cup m) = P(S) + P(m) - P(S \cap m)$

$\frac{974}{1376} = \frac{649}{1376} + \frac{433}{1376} - x$

May 4-7:58 AM

$x = \frac{108}{1376}$

EXAMPLES

3. The results of a survey of the student body at Central High School about television viewing preferences are shown below.

	Comedy Series	Drama Series	Reality Series	Total
Males	95	65	70	230
Females	80	70	110	260
Total	175	135	180	490

Are the events "student is a female" and "student prefers drama series" independent of each other? Justify your answer.

$P(F|D) \stackrel{?}{=} P(F)$

$\frac{P(F \cap D)}{P(D)} \stackrel{?}{=} P(F)$

$P(F \cap D) \stackrel{?}{=} P(F) \cdot P(D)$

$\frac{70}{490} \stackrel{?}{=} \frac{260}{490} \cdot \frac{135}{490}$

Not independent

May 4-7:58 AM

$.142 \stackrel{?}{\neq} .146\ldots$

UNIT 11 REVIEW – STATISTICS

Helpful Tips

Mean $\bar{x}$, μ

Standard deviation σ_x

normalcdf(need μ, σ_x, lower & upper bounds

invnorm(need area under the curve (looking for data point)

Margin of Error (95% Confidence Intervals)

$$\bar{x} \pm 2\sigma$$

May 3-1:57 PM

EXAMPLES

1. Which statement about statistical analysis is *false*?

   1) Experiments can suggest patterns and relationships in data.
   2) Experiments can determine cause and effect relationships.
   3) Observational studies can determine cause and effect relationships.
   4) Observational studies can suggest patterns and relationships in data.

2. The heights of women in the United States are normally distributed with a mean of 64 inches and a standard deviation of 2.75 inches. The percent of women whose heights are between 64 and 69.5 inches, to the *nearest whole percent*, is

   normalcdf(64, 69.5, 64, 2.75)

   .4772...

   48%

May 9-10:46 AM

EXAMPLES

3. An orange-juice processing plant receives a truckload of oranges. The quality control team randomly chooses three pails of oranges, each containing 50 oranges, from the truckload. Identify the sample and the population in the given scenario.

Sample = 3 pails (150) oranges
Population = truckload of oranges

State *one* conclusion that the quality control team could make about the population if 5% of the sample was found to be unsatisfactory.

Approximately 95% of the truckload is satisfactory

May 9-10:46 AM

EXAMPLES

4. In 2013, approximately 1.6 million students took the Critical Reading portion of the SAT exam. The mean score, the modal score, and the standard deviation were calculated to be 496, 430, and 115, respectively. Which interval reflects 95% of the Critical Reading scores? $\bar{x} \pm 2\sigma_x$

1) 430 ± 115

2) 430 ± 230

3) 496 ± 115

4) 496 ± 230

$\bar{x} = \mu = 496$

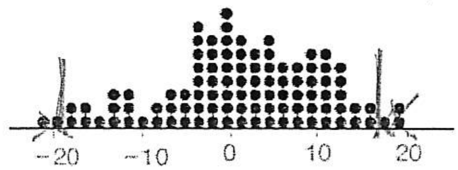
mode = 430

$\sigma_x = 115$

496 ± 230

May 4-7:59 AM

5. Gabriel performed an experiment to see if planting 13 tomato plants in black plastic mulch leads to larger tomatoes than if 13 plants are planted without mulch. He observed that the average weight of the tomatoes from tomato plants grown in black plastic mulch was 5 ounces greater than those from the plants planted without mulch. To determine if the observed difference is statistically significant, he re-randomized the tomato groups 100 times to study these random differences in the mean weights. The output of his simulation is summarized in the dot plot below.



95%

$.05(100) = 5$

Differences in Mean Weight (oz.)

Given these results, what is an appropriate inference that can be drawn?

1) There was no effect observed between the two groups.

2) There was an effect observed that could be due to the random assignment of plants to the groups.

3) There is strong evidence to support the hypothesis that tomatoes from plants planted in black plastic mulch are larger than those planted without mulch.

4) There is strong evidence to support the hypothesis that tomatoes from plants planted without mulch are larger than those planted in black plastic mulch.

May 4-7:59 AM

EXAMPLES

6. Describe how a controlled experiment can be created to examine the effect of ingredient *X* in a toothpaste.

2 random groups, with large enough members, including males & females.
Group A has toothpaste w/ ingredient X in it
Group B has toothpaste w/out ingredient X in it

May 9-10:48 AM

Units 10 & 11 Homework

May 4-7:59 AM

May 8-10:47 AM