Algebra 2 Regents Review HW Assignment for Units 1 & 2

Name:_____ *Key*

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**

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1. Which equation has $1 - i$ as a solution?
   (1) $x^2 + 2x - 2 = 0$
   (2) $x^2 + 2x + x = 0$
   (3) $x^2 - 2x - 2 = 0$
   (4) $x^2 - 2x + 2 = 0$ ⃝

   4) $x^2 - 2x + 1 = -2 + 1$
   $(x-1)^2 = -1$
   $x - 1 = \pm\sqrt{-1}$
   $x - 1 = \pm i$
   $x = 1 \pm i$

2. Which factorization is incorrect?
   (1) $4k^2 - 49 = (2k + 7)(2k - 7)$
   (2) $a^3 - 8b^3 = (a - 2b)(a^2 + 2ab + 4b^2)$
   (3) $m^3 + 3m^2 - 4m + 12 = (m - 2)^2(m + 3)$ ⃝
   (4) $t^3 + 5t^2 + 6t + t^2 + 5t + 6 = (t + 1)(t + 2)(t + 3)$

   3) $\boxed{(m-2)(m-2)}(m+3)$
   $(m^2 - 4m + 4)(m + 3)$
   $m^3 + 3m^2$
   $\quad - 4m^2 - 12m$
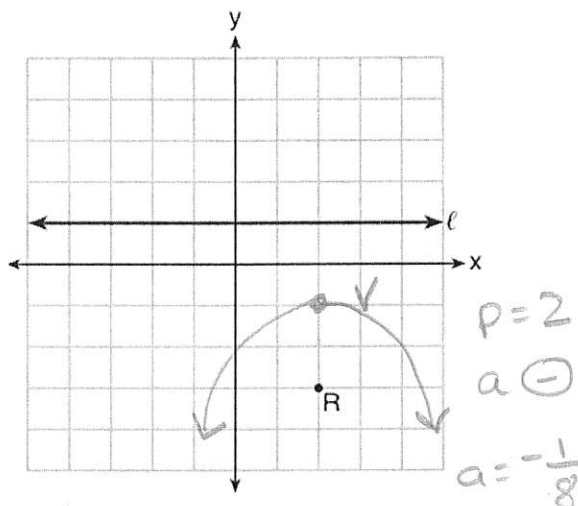 $\qquad\qquad + 4m \quad + 12$
   _____
   $m^3 - m^2 - 8m + 12$

3. The completely factored form of $2d^4 + 6d^3 - 18d^2 - 54d$ is
   (1) $2d(d^2 - 9)(d + 3)$
   (2) $2d(d^2 + 9)(d + 3)$
   (3) $2d(d + 3)^2(d - 3)$ ⃝
   (4) $2d(d - 3)^2(d + 3)$

   $2d^3(d+3) - 18d(d+3)$
   $(2d^3 - 18d)(d+3)$
   $2d(d^2 - 9)(d+3)$
   $2d(d+3)(d-3)(d+3)$

4. Which equation represents the set of points equidistant from line *l* and point *R* shown on the graph below?

   $p = 2$
   $a \ominus$
   $a = -\frac{1}{8}$
   $V(2, -1)$

   (1) $y = -\frac{1}{8}(x + 2)^2 + 1$
   (2) $y = -\frac{1}{8}(x + 2)^2 - 1$
   (3) $y = -\frac{1}{8}(x - 2)^2 + 1$
   (4) $y = -\frac{1}{8}(x - 2)^2 - 1$ ⃝

5. Mr. Farison gave his class three mathematical rules shown below to either prove or disprove. Which rules can be proved for all real numbers?

I. $(m + p)^2 = m^2 + 2mp + p^2$
II. $(x + y)^3 = x^3 + 3xy + y^3$
III. $(a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$

(1) I, only
(2) I and II
(3) II and III
(4) I and III

$I: (m+p)(m+p) = m^2 + mp$
$\qquad\qquad\qquad\qquad + mp + p^2$
$\qquad\qquad\qquad \overline{m^2 + 2mp + p^2}$

$II: \boxed{(x+y)(x+y)}(x+y)$
$(x^2 + 2xy + y^2)(x+y)$
$x^3 + x^2y$
$\qquad + 2x^2y + 2xy^2$
$\qquad\qquad + xy^2 + y^3$
$\overline{x^3 + 3x^2y + 3xy^2 + y^3}$

$III \quad (a^2 + b^2)^2 = (a^2 - b^2)^2 + (2ab)^2$

$(a^2 + b^2)(a^2 + b^2) \quad \Big\} \quad (a^2 - b^2)(a^2 - b^2) + 4a^2b^2$

$a^4 + 2a^2b^2 + b^4 \qquad\qquad a^4 - 2a^2b^2 + b^4 + 4a^2b^2$

$\qquad\qquad\qquad\qquad\qquad a^4 + 2a^2b^2 + b^4$

6. Simplify $xi(i - 7i)^2$, where i is the imaginary unit.

$xi(-6i)^2$

$xi(-36)$

$-36xi$

Algebra 2 Regents Review HW Assignment for Units 3 & 4

Name:_____ *Key*

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**

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1. To the *nearest tenth*, the value of x that satisfies $2^x = -2x + 11$ is
   (1) 2.5
   (2) 2.6
   (3) 5.8
   (4) 5.9

   2ND
   Trace
   5
   To find intersection point

---

2. Sally's high school is planning their spring musical. The revenue, R, generated can be determined by the function $R(t) = -33t^2 + 360t$, where t represents the price of a ticket. The production cost, C, of the musical is represented by the function $C(t) = 700 + 5t$. What is the highest price, to the *nearest dollar*, they can charge in order to *not* lose money on the event?
   (1) $t = 3$
   (2) $t = 5$
   (3) $t = 8$
   (4) $t = 11$

   $-33t^2 + 360t = 700 + 5t$

   2ND
   Trace
   5

   $t = 2.6 \ldots$
   $t = 8.15 \ldots$

---

3. The expression $\frac{x^3 + 2x^2 + x + 6}{x+2}$ is equivalent to
   (1) $x^2 + 3$
   (2) $x^2 + 1 + \frac{4}{x+2}$
   (3) $2x^2 + x + 6$
   (4) $2x^2 + 1 + \frac{4}{x+2}$

   $$-2 \,\overline{\big|\; 1 \quad 2 \quad 1 \quad 6}$$
   $$\quad\quad\;\; \downarrow \;\; -2 \quad 0 \quad -2$$
   $$\overline{\quad\quad 1x^2 + 0x + 1 \quad r = 4}$$

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4. The focal length, F, of a camera's lens is related to the distance of the object from lens, J, and the distance to the image are in the camera, W, by the formula below.
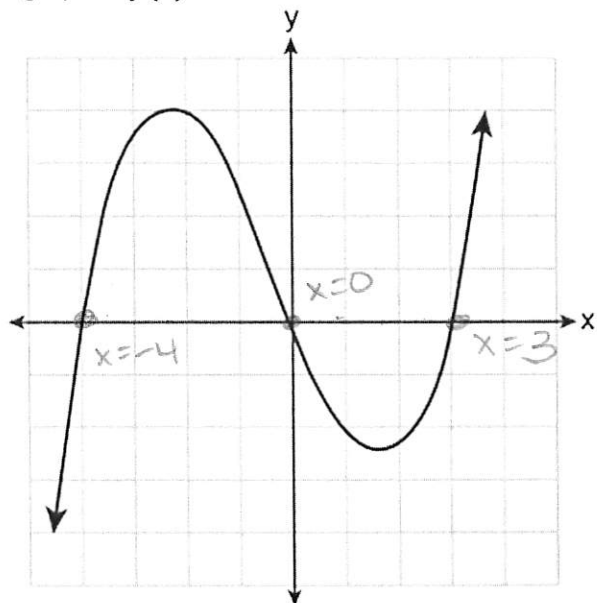 $$\frac{1}{J} + \frac{1}{W} = \frac{1}{F}$$
   When this equation is solved for J in terms of F and W, J equals
   (1) $F - W$
   (2) $\frac{FW}{F-W}$
   (3) $\frac{FW}{W-F}$
   (4) $\frac{1}{F} - \frac{1}{W}$

   $\frac{WF + JF}{JWF} = \frac{JW}{JWF}$

   $WF + JF = JW$

   $WF = JW - JF$

   $WF = J(W - F)$

   $\frac{WF}{W-F} \quad \frac{}{W-F}$

5. The graph of $p(x)$ is shown below.

What is the remainder when $p(x)$ is divided by $x = 4$?

$x + 4$

(1) $x - 4$
(2) -4
(3) 0
(4) 4

$$\frac{x(x+4)(x-3)}{(x+4)}$$

$r = 0$

6. Which value is *not* contained in the solution of the system below?

$$a + 5b - c = -20$$
$$4a - 5b + 4c = 19$$
$$-a - 5b - 5c = 2$$

(1) -2
(2) 2
(3) 3
(4) -3

get rid of b

$a + 5b - c = -20$
$4a - 5b + 4c = 19$
_____
$5a + 3c = -1$

$a + 5b - c = -20$
$-a - 5b - 5c = 2$
_____
$-6c = -18$

$\boxed{c = 3}$

$5a + 3(3) = -1$
$5a + 9 = -1$
$5a = -10$
$\boxed{a = -2}$

$a + 5b - c = -20$
$-2 + 5b - 3 = -20$
$5b - 5 = -20$
$5b = -15$
$\boxed{b = -3}$

Algebra 2 Regents Review HW Assignment for Units 5 & 6
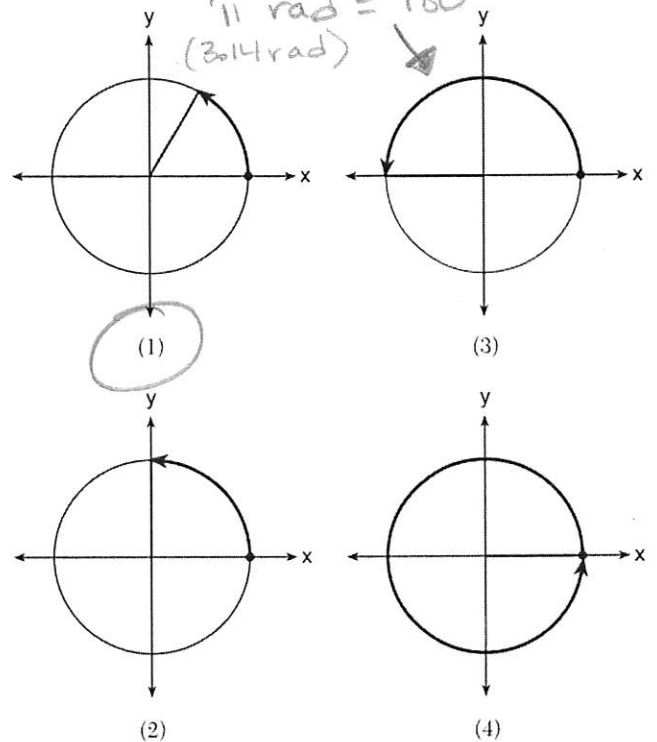
Name:_____ Key

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**
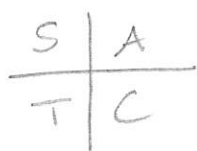
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1. Which equation represents an odd function?
   - (1) $y = \sin x$
   - (2) $y = \cos x$
   - (3) $y = (x + 1)^3$
   - (4) $y = e^{5x}$

   reflection through the origin (180°)

2. Which diagram shows an angle rotation of 1 radian on the unit circle?
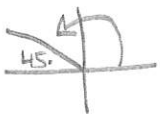
   π rad = 180° (3.14 rad)

   (1)   (2)   (3)   (4)

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3. Using the identity $\sin^2\theta + \cos^2\theta = 1$, find the value of $\tan\theta$, to the *nearest hundredth*, if $\cos\theta$ is -0.7 and θ is in Quadrant II.

S	A
T	C

   $\tan\theta = -1.02...$

   -1.02

   $\cos\theta = -0.7$

   ref $x = \cos^{-1}(.7)$

   $= 45.57...$

   $\theta = 180 - 45.57...$

   $\theta = 134.427...$

4. The x-value of which functions x-intercept is larger, f or h? Justify your answer

x	h(x)
-1	6
0	4
1	2
2	0
3	-2

   $f(x) = \log(x - 4)$

   $0 = \log(x-4)$ ✱ Look at graph

   $x = 5$

   $f(x)$ has a larger x-intercept

5. Find algebraically the zeros for $p(x) = x^3 + x^2 - 4x - 4$.

$$x^3 + x^2 - 4x - 4 = 0$$
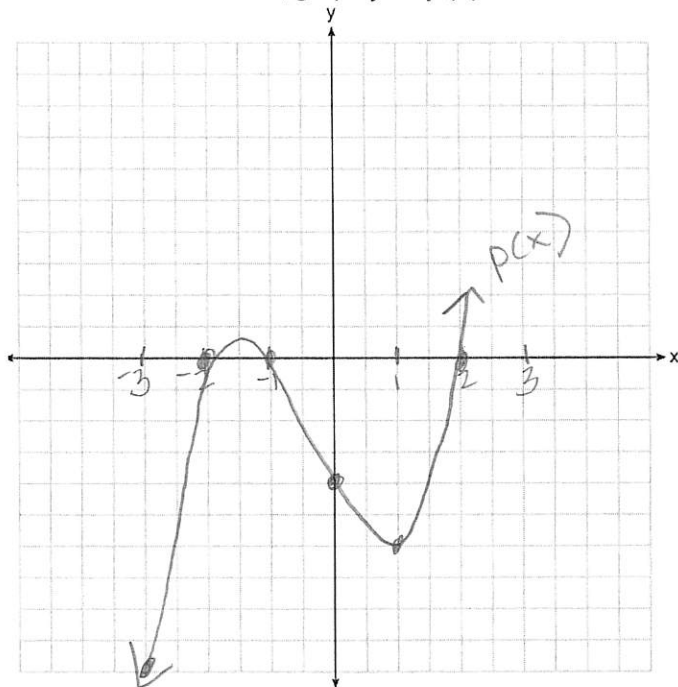$$x^2(x+1) - 4(x+1) = 0$$
$$(x^2-4)(x+1) = 0$$
$$(x+2)(x-2)(x+1) = 0$$
$$x = -2, 2, -1$$

On the set of axis below, graph $y = p(x)$.

x	y
-3	-10
-2	0
-1	0
0	-4
1	-6
2	0
3	20

6. Solve the equation $\sqrt{2x-7} + x = 5$ algebraically, and justify the solution set.

$$\sqrt{2x-7} + x = 5$$
$$(\sqrt{2x-7})^2 = (5-x)^2$$
$$2x - 7 = 25 - 10x + x^2$$
$$0 = x^2 - 12x + 32$$
$$0 = (x-4)(x-8)$$
$$x = 4, 8$$
$$\{4\}$$

Algebra 2 Regents Review HW Assignment for Units 7 & 9

Name:_____ *Key*_____

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**

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1. A recursive formula for the sequence $18, 9, 4.5, \ldots$ is

   (1) $g_1 = 18; g_n = \frac{1}{2}g_{n-1}$

   (2) $g_n = 18\left(\frac{1}{2}\right)^{n-1}$

   (3) $g_1 = 18; g_n = 2g_{n-1}$

   (4) $g_n = 18(2)^{n-1}$

   $\cdot \frac{1}{2}$

   geometric

   $r = \frac{1}{2}$

   $g_1 = 18$

2. Kristin wants to increase her running endurance. According to experts, a gradual mileage increase of 10% per week can reduce the risk of injury. If Kristin runs 8 miles in week one, which expression can help her find the total number of miles she will have run over the course of her 6-week training program?

   (1) $\sum_{n=1}^{6} 8(1.10)^{n-1}$

   (2) $\sum_{n=1}^{6} 8(1.10)^{n}$

   (3) $\frac{8-8(1.10)^6}{0.90}$

   (4) $\frac{8-8(1.10)^6}{1.10}$

---

3. A sine function increasing through the origin can be used to model light waves. Violet has a _wavelength_ of 400 nanometers. Over which interval is the height of the wave _decreasing_, only?

   (1) $(0, 200)$
   (2) $(100, 300)$
   (3) $(200, 400)$
   (4) $(300, 400)$

   $per = 400$

   $Interval = \frac{per}{4} = \frac{400}{4} = 100$

4. The sequence $a_1 = 6$, $a_n = 3a_{n-1}$ can also be written as

   (1) $a_n = 6 \cdot 3^n$
   (2) $a_n = 6 \cdot 3^{n+1}$
   (3) $a_n = 2 \cdot 3^n$
   (4) $a_n = 6 \cdot 3^{n+1}$

   $a_1 = 6$

   $a_n = 3a_{n-1}$

   geom

   $r = 3$

   $a_n = a_1 (r)^{n-1}$

   $= 6(3)^{n-1}$

   $= 2 \cdot 3(3)^{n-1}$

   $= 2(3)^n$

   ⭐ Check on Calculator

5. In 2010, the population of New York State was approximately 19,378,000 with an annual growth rate of 1.5%. Assuming the growth rate is maintained for a large number of years, which equation can be used to predict the population of New York State t years after 2010?

(1) $P(t) = 19{,}378{,}000(1.5)^t$ ⭕

(2) $P_0 = 19{,}378{,}000; P(t) = 19{,}378{,}000 + 1.015P_{t-1}$

(3) $P(t) = 19{,}378{,}000(1.5)^{t-1}$

(4) $P_0 = 19{,}378{,}000; P(t) = 1.015P_{t-1}$

6. The volume of air in a person's lungs, as the person breaths in and out, can be modeled by a sine graph. A scientist is studying the differences in this volume for people at rest compared to people told to take a deep breath. When examining the graphs, should the scientist focus on the amplitude, period, or midline? Explain your choice.

$y = \sin x$

Amplitude because the height of the graph shows the volume of the air

7. The distance needed to stop a car after applying the brakes varies directly with the car's speed. The table below shows stopping distances for various speeds.

Speed (mph)	10	20	30	40	50	60	70
Distance (ft)	6.25	25	56.25	100	156.25	225	306.25

Determine the average rate of change in braking distance, in ft/mph, between one traveling at 50 mph and one traveling at 70 mph.

$$AROC = \frac{306.25 - 156.25}{70 - 50} = 7.5 \frac{ft}{mph}$$

Explain what this rate of change means as it relates to braking distance.

Between 50 & 70 mph, each additional mph in speed requires 7.5 more feet to stop.

Algebra 2 Regents Review HW Assignment for Unit 8

Name:_____ Key

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**

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1. An equation to represent the value of a car after t months of ownership is $v = 32{,}000(0.81)^{\frac{t}{12}}$. Which statement is *not* correct?
   (1) The car lost approximately 19% of its value each month.   T
   (2) The car maintained approximately 98% of its value each month.
   (3) The value of the car when it was purchased was $32,000.   T
   (4) The value of the car 1 year after it was purchased was $25,920.   T

2. A payday loan company makes loans between $100 and $1000 available to customers. Every 14 days, customers are charged 30% interest with compounding. In 2013, Remi took out a $300 payday loan. Which expression can be used to calculate the amount she would owe, in dollars, after one year if she did not make payments?
   (1) $300(.30)^{\frac{14}{365}}$
   (2) $300(1.30)^{\frac{14}{365}}$
   (3) $300(.30)^{\frac{365}{14}}$
   (4) $300(1.30)^{\frac{365}{14}}$

3. Explain how $\left(3^{\frac{1}{5}}\right)^2$ can be written as the equivalent radical expression $\sqrt[5]{9}$.

$$\left(3^{\frac{1}{5}}\right)^2 = 3^{\frac{2}{5}} = \sqrt[5]{3^2}$$
$$= \sqrt[5]{9}$$

When you have a power to a power, you multiply. The exponent $\frac{2}{5}$ means the 5th root of 3 squared.

4. One of the medical uses of Iodine-131 (I-131), a radioactive isotope of iodine, is to enhance x-ray images. The half-life of I-131 is approximately 8.02 days. A patient is injected with 20 mg of I-131. Determine, to the *nearest day*, the amount of time needed before the amount of I-131 in the patient's body is approximately 7 mg.

$$7 = 20\left(\tfrac{1}{2}\right)^{\frac{t}{8.02}}$$
$$.35 = \left(\tfrac{1}{2}\right)^{t/8.02}$$
$$\log_{\frac{1}{2}}(.35) = \frac{t}{8.02}$$
$$1.514\ldots = \frac{t}{8.02}$$
$$12.14\ldots = t$$
$$t \approx 12 \text{ days}$$

5. Seth's parents gave him $5000 to invest for his 16th birthday. He is considering two investment options. Option A will pay him 4.5% interest compounded annually. Option B will pay him 4.6% compounded quarterly.

Write a function of option A and option B that calculates the value of each account after *n* years.

$$A = 5000(1 + .045)^t \qquad\qquad B = 5000\left(1 + \frac{.046}{4}\right)^{4t}$$

Seth plans to use the money after he graduates from college in 6 years. Determine how much more money option B will earn than option A to the *nearest cent*.

$$A(6) = 6511.30\ldots$$

$$B(6) = 6578.86\ldots$$

$$B(6) - A(6) = \$67.57$$

Algebraically, determine, to the *nearest tenth of a year*, how long it would take for option B to double Seth's initial investment.

$$10000 = 5000\left(1 + \frac{.046}{4}\right)^t$$

$$2 = (1.0115)^t$$

$$\log_{1.0115} 2 = t$$
$$\quad\; B \qquad\;\; A \qquad E$$

$$60.61\ldots = t$$

$$60.6 \text{ years}$$

Algebra 2 Regents Review HW Assignment for Units 10 & 11

Name:_____ *Key*

Directions: Complete all of the problems below. Show all work. Even if a question is multiple choice, you **must show all work!**

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1. Which statement(s) about statistical studies is <u>true</u>?
   - I. A survey of all English classes in a high school would be a good sample to determine the number of hours students throughout the school spend studying. *True*
   - II. A survey of all ninth graders in high school would be a good sample to determine the number of student parking spaces needed at that high school. *False*
   - III. A survey of all students in one lunch period in a high school would be a good sample to determine the number of hours adults spend on social media websites.
   - IV. A survey of all Calculus students in a high school would be a good sample to determine the nuber of students throughout the high school who don't like math. *False*

   (1) I, only
   (2) II, only
   (3) I and III
   (4) III and IV

2. The lifespan of a 60-watt light bulb produced by a company is normally <u>distributed</u> with a mean of 1450 hours and a standard deviation of 8.5 hours. If a 60-watt light bulb produced by this company is selected at random, what is the probability that its lifespan will be between <u>1440 and 1465 hours</u>?
   - (a) 0.3803
   - (b) 0.4612
   - (c) 0.8415
   - (d) 0.9612

   $\bar{x} = 1450$
   $\sigma_x = 8.5$

   $\text{norm cdf } (1440, 1465, 1450, 8.5)$

   $= .8414...$

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3. Elizabeth waited for <u>6 minutes</u> at the drive thru at her favorite fast-food restaurant the last time she visited. She was upset about having to wait that long and notified the manager. The manager assured her that her experience was very unusual and that it would not happen again.

   A study of customers commissioned by this restaurant found an approximately normal distribution of results. The mean wait time was <u>226 seconds</u> and the standard deviation was <u>38 seconds</u>. Given these data, and using a <u>95%</u> confidence interval, was Elizabeth's wait time unusual? Justify your answer.

   $\mu = 226$
   $\sigma_x = 38$

   Wait Time $= 6(60)$
   $= 360 \sec$

   $95\% \text{ CI} = 2\sigma = 76$

   $226 - 76 \quad \downarrow \quad 226 + 76$

   $\boxed{150 \quad - \quad 302}$

   Yes her wait time is unusual because it falls outside of our 95% CI

4. Given events A and B, such that $P(A) = 0.6$, $P(B) = 0.5$, and $P(A \cup B) = 0.8$, determine whether A and B are independent or dependent.

   $P(A) \cdot P(B) \overset{?}{=} P(A \cap B)$
   $.6 (.5) = .3 \checkmark$

   $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   $.8 = .6 + .5 - P(A \cap B)$
   $-.3 = -P(A \cap B)$
   $.3 = P(A \cap B)$

   Yes Independent

5. The set of fata in the table below shows the results of a survey on the number of messages that people of different ages text on their cell phones each month.

Age Group	Text Messages per Month		
	0–10	11–50	Over 50
15–18	4	37	68
19–22	6	25	87
23–60	25	47	157

If a person from this survey is selected at random, what is the probability that the person texts over 50 messages per month given that the person is between the ages of 23 and 60?

(1) $\frac{157}{229}$

(2) $\frac{157}{312}$

(3) $\frac{157}{384}$

(4) $\frac{157}{456}$

$P(>50 \mid 23\text{-}60)$

$\dfrac{P(>50 \wedge 23\text{-}60)}{P(23\text{-}60)} = \dfrac{157}{456}$

$\dfrac{229}{456}$

$\dfrac{157}{229}$

6. A candidate for political office commissioned a poll. His staff received responses from 900 likely voters and 55% of them said they would vote for the candidate. The staff then conducted a simulation of 1000 more polls of 900 voters, assuming that 55% of voters would vote for their candidate. The output of the simulation is shown in the diagram below.
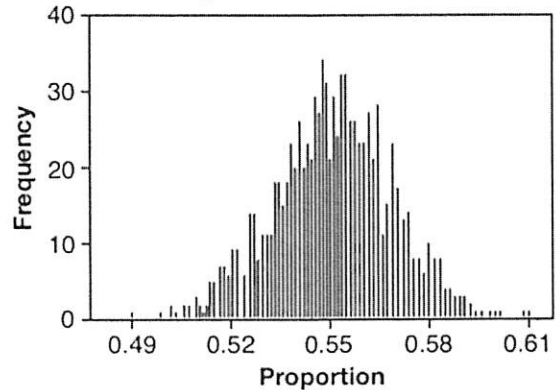
Given this output, and assuming a 95% confidence level, the margin of error for the poll is closest to

(1) 0.01

(2) 0.03

(3) 0.06

(4) 0.12

$MOE = 2\sigma$

$\sigma = .03$

$2(.03) = .06$

7. Ayva designed an experiment to determine the effect of a new energy drink on a group of 20 volunteer students. Ten students were randomly selected to form group 1 while the remaining 10 made up group 2. Each student in group 1 drank one energy drink, and each student in group 2 drank one cola drink. Ten minutes later, their times were recorded for reading the same paragraph of a novel. The results of the experiment are shown in the table below.

Group 1 (seconds)	Group 2 (seconds)
17.4	23.3
18.1	18.8
18.2	22.1
19.6	12.7
18.6	16.9
16.2	24.4
16.1	21.2
15.3	21.2
17.8	16.3
19.7	14.5
Mean = 17.7	Mean = 19.1

a) Ayva thinks drinking energy drinks makes students read faster. Using information from the experimental design or the results, explain why Ayva's hypothesis may be *incorrect*.

Ayva may be incorrect because their was no control group (didn't drink energy drink)

Using the given results, Ayva randomly mixes the 20 reading times, splits them into two groups of 10, and simulates the difference of the means 232 times.

Simulated Differences

Differences (Group 1 – Group 2)
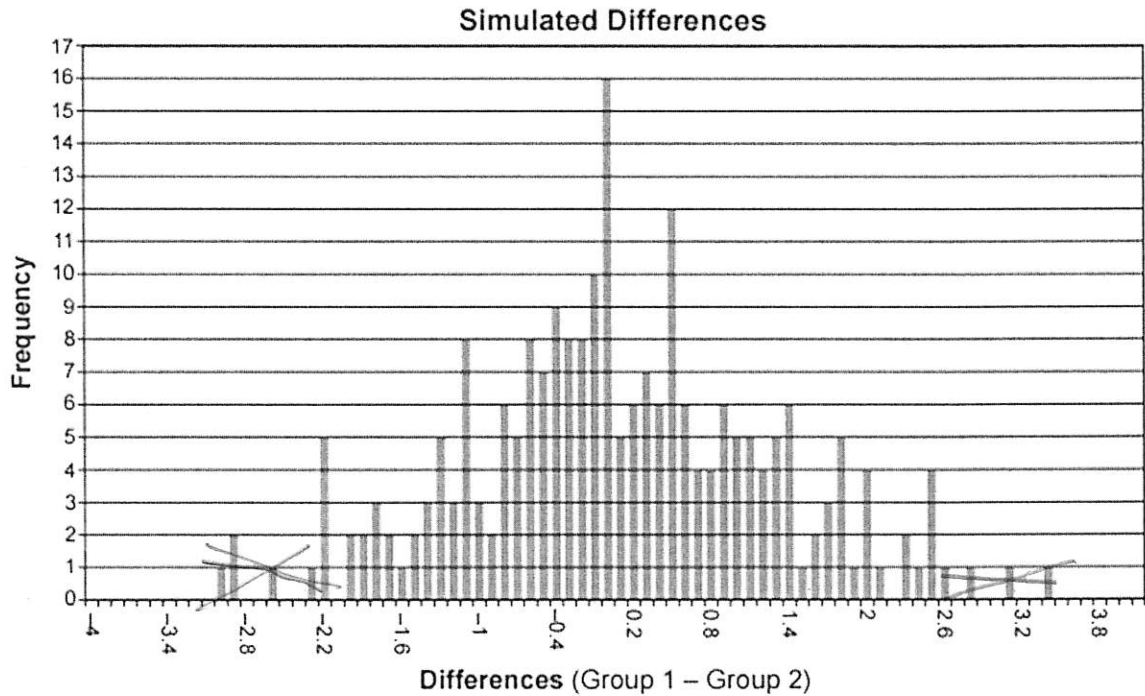
b) Ayva decided that the difference in mean reading times is *not* an unusual occurrence. Support her decision using the results of the simulation. Explain your reasoning.

95% CI
(take 5% off ends)

.05(232) = 11.6   (Take off 6-ish on each side)

Difference In Means : 19.1 – 17.7
= 1.4

Ayva is correct because 1.4 falls within our 95% confidence interval.