Review of Derivative Rules for Quiz #3.1

You may not use a calculator. Circle the correct choice on all multiple choice questions.

1) Given $f(x) = x^2(2x-5)^5$, find $f'(x)$.

a) $f'(x) = 10x^2(2x-5)$

b) $f'(x) = 2x(2x-5)^4(3x+5)$

c) $f'(x) = 2x[(30x^2-75x)(2x-5)^4]$

d) $f'(x) = 2x(2x-5)^4(7x-5)$

e) None of these

$f'(x) = x^2\left(5(2x-5)^4(2)\right) + (2x-5)^5(2x)$

$f'(x) = 10x^2(2x-5)^4 + 2x(2x-5)^5$

$f'(x) = 2x(2x-5)^4\left[5x+2(2x-5)\right]$

$f'(x) = 2x(2x-5)^4(7x-5)$

2) Differentiate: $y = \dfrac{3x}{x^2+1}$

$y' = \dfrac{(x^2+1)(3) - (3x)(2x)}{(x^2+1)^2}$

a) $\dfrac{3}{x^2+1}$

b) $\dfrac{-3(x^2-1)}{(x^2+1)^2}$

c) $\dfrac{3}{2x}$

d) $\dfrac{3x^2-3}{(x^2+1)^3}$

e) None of these

$y' = \dfrac{3x^2+3-6x^2}{(x^2+1)^2} = \dfrac{-3x^2+3}{(x^2+1)^2} = \dfrac{-3(x^2-1)}{(x^2+1)^2}$

3) If $g(x) = \dfrac{1}{32}x^4 - 5x^2$, find $g'(4)$

a) -72

b) -32

c) -24

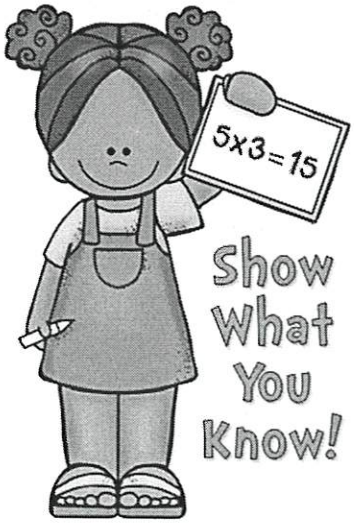
d) 24

e) 32

$g' = \dfrac{4}{32}x^3 - 10x$

$g'(4) = \dfrac{4}{32}(4)^3 - 10(4)$

$g'(4) = 8 - 40 = -32$



4) If $f(x)=\frac{x^5-x+2}{x^3+7}$, find $f'(x)$

$f'(x)=\frac{(x^3+7)(5x^4-1)-(x^5-x+2)(3x^2)}{(x^3+7)^2}$

a) $\frac{5x^4-1}{3x^2}$

b) $\frac{(5x^4-1)-(3x^2)}{(x^3+7)^2}$

c) $\frac{(x^3+7)(5x^4-1)-(x^5-x+2)(3x^2)}{(x^3+7)}$

d) $\frac{(x^5-x+2)(3x^2)-(x^3+7)(5x^4-1)}{(x^3+7)^2}$

e) $\frac{(x^3+7)(5x^4-1)-(x^5-x+2)(3x^2)}{(x^3+7)^2}$

5) ~~6)~~ Let g(x) = -7f(x) and f'(-7) = -9. Find g'(-7)

$g(x)=-7\cdot f(x)$

$g'(x)=-7\cdot f'(x)$ (1)

$g'(-7)=-7\cdot f'(-7)$

$=-7(-9)=63$

a) -7

b) -9

c) 0

d) 63

e) None of these

6) ~~7)~~ Find $\frac{d}{dx}x^2[f(x)]$

$y=x^2\cdot f(x)$

$y'=x^2\cdot f'(x)+f(x)\cdot 2x$

$y'=x\left[x\cdot f'(x)+2\cdot f(x)\right]$

a) x [xf'(x) + 2f(x)]

b) 2x [f'(x)]

c) x [xf(x) + 2f'(x)]

d) x^2 [f'(x)]

e) None of these

$$\frac{dy}{dx} = \frac{(x-1)(1) - (x+3)(1)}{(x-1)^2} = \frac{x-1-x-3}{(x-1)^2}$$

7) ~~8)~~ Find $\frac{d^2y}{dx^2}$ for $y = \frac{x+3}{x-1}$

a) 0

b) $\frac{-8}{(x-1)^3}$

c) $\frac{-4}{(x-1)^3}$

d) $\frac{8}{(x-1)^3}$

e) None of these

$$\frac{dy}{dx} = \frac{-4}{(x-1)^2} = -4(x-1)^{-2}$$

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

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

8) ~~9)~~ Find $f'(x)$ for $f(x) = (2x^2 + 5)^7$

a) $7(4x)^6$

b) $(4x)^7$

c) $7(2x^2 + 5)^6$

d) $28x(2x^2 + 5)^6$

e) None of these

$$f'(x) = 7(2x^2+5)^6(4x)$$

$$f'(x) = 28x(2x^2+5)^6$$

9) ~~10)~~ If $f(2) = 3$ and $f'(2) = -1$, find an equation of the tangent line when $x = 2$.

a) $y - 3 = 2(x + 1)$

b) $y - 2 = 3(x + 1)$

c) $y - 3 = -1(x - 2)$

d) $y + 1 = 2(x - 2)$

e) none of the above

pt : (2, 3)

m : −1

$$y - 3 = -1(x-2)$$

10) **BONUS:** Find $f'(x)$ if $f(x) = \sin^3 4x$

a) $4\cos^3 4x$

b) $\cos^3 4x$

c) $12 \sin^2 4x \cos 4x$

d) $3 \sin^2 4x \cos 4x$

e) None of these

$$f(x) = (\sin(4x))^3$$

$$f'(x) = 3(\sin(4x))^2(\cos(4x))(4)$$

$$f'(x) = 12\sin^2(4x)\cos(4x)$$