Allen – Math 160 A Quiz #5 Name: Key

1. Determine the derivative of $y = 2.35x^{-1/2} - 2.3x^{-2/3}$. You can leave your answer with negative and fractional exponents.

$$y' = 2.35(-\tfrac{1}{2})x^{-3/2} - 2.3(-\tfrac{2}{3})x^{-5/3} \quad +3$$

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$$= \boxed{-1.175x^{-3/2} + 1.5333x^{-5/3}} \quad +2$$

2. Determine the derivative of $g(x) = (3x^2 - 2x + 1)(2x^2 + 5x - 7)$.

$$g'(x) = (3x^2-2x+1)\frac{d}{dx}[2x^2+5x-7] + \frac{d}{dx}[3x^2-2x+1](2x^2+5x-7) \quad +3$$

$$= \boxed{(3x^2-2x+1)(4x+5) + (6x-2)(2x^2+5x-7)} \quad +2$$

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$$= (12x^3+15x^2-8x^2-10x+4x+5) + (12x^3+30x^2-42x-4x^2-10x+14)$$

$$= 12x^3+7x^2-6x+5+12x^3+26x^2-52x+14 = \boxed{24x^3+33x^2-58x+19}$$

3. Let $g(x) = \dfrac{3x^2 - 2x}{-2x + 3}$.

(a) Determine $g'(x)$.

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$$g'(x) = \frac{(-2x+3)\frac{d}{dx}[3x^2-2x] - (3x^2-2x)\frac{d}{dx}[-2x+3]}{(-2x+3)^2} \quad +3 \quad = \boxed{\frac{(-2x+3)(6x-2)-(3x^2-2x)(-2)}{(-2x+3)^2}}$$

$$= \frac{-12x^2+4x+18x-6+6x^2-4x}{(-2x+3)^2} = \boxed{\frac{-6x^2+18x-6}{(-2x+3)^2}} = \boxed{\frac{-6(x^2-3x+1)}{(-2x+3)^2}} \quad +2$$

(b) Determine an equation of the line tangent to the graph of the function at $x = -1$.

<u>slope:</u> $$m = \frac{-6(-1)^2+18(-1)-6}{(-2(-1)+3)^2} = \frac{-6-18-6}{(2+3)^2} = \frac{-30}{25} = \frac{-6}{5} \quad +2$$

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<u>point:</u> $x = -1$

$$y = g(-1) = \frac{3(-1)^2-2(-1)}{-2(-1)+3} = \frac{3+2}{2+3} = \frac{5}{5} = 1 \quad \rightarrow \text{pt: } (-1,1) \quad +2$$

$$\boxed{y-1 = \frac{-6}{5}(x+1)} \Rightarrow y-1 = \frac{-6}{5}x - \frac{6}{5} \Rightarrow \boxed{y = \frac{-6}{5}x - \frac{1}{5}} \quad +1$$