Revised

Math 234 B Discussion BD6 Quiz 4 **Name (Last,First):** Solutions

You must show all your work to receive credit. Use only the methods from 2.2 and 2.3 (nothing more advanced).

1.] (2 pts) Differentiate the function; simplify your answer.

$$f(x) = 6x^3 - x - 2 + \frac{7}{\sqrt{x}} = 6x^3 - x^1 - 2 + 7x^{-1/2}$$

$$f'(x) = 6(3)x^{3-1} - 1x^0 - 0 + 7(-\tfrac{1}{2})x^{-\frac{1}{2}-1} = 18x^2 - 1 - \tfrac{7}{2}x^{-3/2}.$$

2.] (2pts) Find the *equation* of the line that is tangent to the graph of $y = (1+9x)(-2x-5)$ at the point $(0, -5)$.

$y = -2x - 45x - 18x^2 - 5$

$y = -18x^2 - 47x - 5.$

$y' = -36x - 47$

$m_{tan} = y'|_{x=0} = -36(0) - 47$

$m_{tan} = -47$

$y = mx + b$

$-5 = -47(0) + b$

$-5 = b$

So then the tan line is

$$\boxed{y = -47x - 5}$$

3.] (2pts) Differentiate the function; simplify your answer.

$$P(u) = \frac{-u^4}{7-u}$$

$$P'(u) = \frac{(-u^4)'(7-u) - (-u^4)(7-u)'}{(7-u)^2} = \frac{(-4u^3)(7-u) + u^4(-1)}{(7-u)^2}$$

$$= \frac{-28u^3 + 4u^4 - u^4}{(7-u)^2} = \frac{3u^4 - 28u^3}{(7-u)^2}.$$

4.] (2pts) Find the *second* derivative of the function. Simplifying your answers between steps will make it easier. Easiest Way:

$$f(x) = \left(\frac{5}{x}\right)(\sqrt{x} + 1) = 5x^{-1}(x^{1/2} + 1) = 5x^{-1/2} + 5x^{-1}.$$

$$f'(x) = -\frac{5}{2}x^{-3/2} - 5x^{-2}.$$

$$f''(x) = \frac{15}{4}x^{-5/2} + 10x^{-3}.$$

5.] (2pts) Find all points (x_0, y_0) on the graph of $f(x) = -5x^3 - 15x^2 + 8$ where the tangent line is horizontal. (means $m_{tan} = 0 \Rightarrow f'(x) = 0$)

$f'(x) = -15x^2 - 30x.$

Solve $-15x^2 - 30x = 0$

$-15x(x+2) = 0$

$x = 0 \quad x = -2$

Then $f(0) = -5(0) - 15(0) + 8 = 8.$

and $f(-2) = -5(-2)^3 - 15(-2)^2 + 8$

$= 40 - 60 + 8 = -12.$

So the points are $(0, 8)$ and $(-2, -12)$.