Revised

Math 234 B Discussion BD4 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.

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

$$f'(x) = 7(3)x^{3-1} - 1x^0 - 0 + 2\left(\frac{-1}{2}\right)x^{-1/2-1} = 21x^2 - 1 - x^{-3/2}.$$

2.] (2pts) Find the *equation* of the line that is tangent to the graph of $y = (4x-1)(7-3x)$ at the point $(0, -7)$.

$$m_{tan} = y'\Big|_{x=0} = -24(0)+31 = 31.$$

$$y - y_1 = m(x - x_1)$$
$$y - (-7) = 31(x - 0)$$
$$\boxed{y = 31x - 7}$$

$$y = 28x - 7 - 12x^2 + 3x$$
$$y = -12x^2 + 31x - 7$$
$$y' = -24x + 31$$

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

$$P(u) = \frac{-u^3}{5-u} \qquad P'(u) = \frac{(-u^3)'(5-u) - (-u^3)(5-u)'}{(5-u)^2} = \frac{-3u^2(5-u) + u^3(-1)}{(5-u)^2}$$

$$= \frac{-15u^2 + 3u^3 - u^3}{(5-u)^2} = \frac{-15u^2 + 2u^3}{(5-u)^2}.$$

4.] (2pts) Find the *second* derivative of the function. Simplifying your answers between steps will make it easier. Long way: (Check BD6 quiz for easier way)

$$f(x) = \left(\frac{1}{x^2}\right)(\sqrt{x} + 7)$$
$$f(x) = (x^{-2})(x^{1/2} + 7)$$
$$f'(x) = (x^{-2})'(x^{1/2} + 7) + (x^{-2})(x^{1/2} + 7)'$$
$$= -2x^{-3}(x^{1/2} + 7) + x^{-2}\left(\tfrac{1}{2}x^{-1/2}\right)$$

$$f'(x) = -2x^{-3+1/2} - 14x^{-3} + \frac{1}{2}x^{-2-1/2}$$
$$= -2x^{-5/2} - 14x^{-3} + \frac{1}{2}x^{-5/2}.$$
$$f''(x) = 5x^{-7/2} + 42x^{-4} - \frac{5}{4}x^{-7/2}$$
$$= \frac{15}{4}x^{-7/2} + 42x^{-4}.$$

5.] (2pts) Find all points (x_0, y_0) on the graph of $f(x) = 4x^3 - 12x^2 + 2$ where the tangent line is horizontal. $f'(x) = m_{tan} = 0$.

$$f'(x) = 12x^2 - 24x$$
$$12x^2 - 24x = 0$$
$$12x(x-2) = 0$$
$$x = 0 \quad x = 2$$

Then $f(0) = 4(0) - 12(0) + 2 = 2$.
and $f(2) = 4(2)^3 - 12(2)^2 + 2$
$= 32 - 48 + 2 = 14$.

So the points are $(0,2)$ and $(2,14)$.