Math 220 (section ???) **Quiz 4** **Spring 2011**

Name SOLUTIONS

- No calculators allowed.
- Show sufficient work to justify each answer.
- You have 15 minutes for this quiz.

1. (2 points each) Using Leibniz notation (i.e., $\frac{dy}{dx}$, $\frac{dP}{dt}$, etc.), find derivatives for each of the following functions. Simplify each answer as much as possible.

(a) $w = 3t^5 - \dfrac{1}{3t^5}$ $= 3t^5 - \frac{1}{3}t^{-5}$

$\dfrac{dw}{dt} = 3(5t^4) - \frac{1}{3}(-5t^{-6})$

$= 15t^4 + \dfrac{5}{3t^6}$

(b) $H = 3e^r + 2e^\pi - \ln 5$

$\dfrac{dH}{dr} = 3e^r$

Note: $2e^\pi - \ln 5$ is a constant

(c) $y = \left(\dfrac{\sqrt{x}}{\sqrt[3]{x}}\right)^{12}$ $= \left(\dfrac{x^{1/2}}{x^{1/3}}\right)^{12} = \left(x^{\frac{1}{2}-\frac{1}{3}}\right)^{12}$

$= (x^{1/6})^{12}$

$= x^2$

So $\dfrac{dy}{dx} = 2x$

2. (2 points) Determine a derivative for the given function. Do not simplify your answer.

$$f(x) = \frac{10x^2 - 6x + 4}{x^3 + 5}$$

$$f'(x) = \frac{(10x^2-6x+4)'(x^3+5) - (10x^2-6x+4)(x^3+5)'}{(x^3+5)^2}$$

$$f'(x) = \frac{(20x-6)(x^3+5) - (10x^2-6x+4)(3x^2)}{(x^3+5)^2}$$

3. (2 points) Find the x-value for each point on the graph of $f(x) = x^3 - 11x + 62$ where the line tangent to the curve has a slope of 4.

$$f'(x) = 3x^2 - 11$$

$$3x^2 - 11 = 4$$

$$3x^2 = 15$$

$$x^2 = 5$$

$$x = \pm\sqrt{5}$$