Math 220 (section AD?) **Quiz 4** **Fall 2013**

Name Solutions

- You have 15 minutes
- No calculators
- Show sufficient work

1. (2 points) Determine the value of $g'(1)$ given that $g(x) = 4x^3e^x$.

$g'(x) = (4x^3)'(e^x) + (4x^3)(e^x)'$

$= 12x^2e^x + 4x^3e^x$

$g'(1) = 12(1)^2e^1 + 4(1)^3e^1$

$= 12e + 4e$

$= 16e$

2. (2 points) Determine the equation of the line which is tangent to the curve

$$y = 4\tan x + 5\cos x + 2e^x + 8$$

at its y-intercept.

For the y-intercept, set $x = 0$,

$y = 4\tan(0) + 5\cos(0) + 2e^0 + 8$

$= 0 + 5 + 2 + 8$

$= 15$

POINT

(0, 15)

$y' = 4\sec^2 x - 5\sin x + 2e^x$

$y'(0) = 4\sec^2(0) - 5\sin(0) + 2e^0$

$= 4 - 0 + 2$

$= 6$

SLOPE

6

tangent line

$y - 15 = 6(x - 0)$

$y = 6x + 15$

3. (2 points each) Using Leibniz notation (i.e., $\frac{dy}{dx}$, $\frac{dP}{dt}$, etc.), find derivatives for each of the following functions.

(a) $y = x^2 + \sqrt{\ln\left(2e^{\cos(\pi/5)}\right)}$ (simplify your answer)

constant

$$\frac{dy}{dx} = 2x$$

(b) $w = \left(\frac{\sqrt{p^3}}{p\sqrt[3]{p}}\right)^{30}$ (simplify your answer)

$$= \left(\frac{(p^3)^{1/2}}{p \cdot p^{1/3}}\right)^{30} = \left(\frac{p^{3/2}}{p^{4/3}}\right)^{30} = \left(p^{\frac{3}{2}-\frac{4}{3}}\right)^{30}$$

$$= \left(p^{1/6}\right)^{30} = p^5$$

$$\frac{dw}{dp} = 5p^4$$

(c) $q = \frac{4\sin t}{t^2+3}$

$$\frac{dq}{dt} = \frac{(4\sin t)'(t^2+3) - (4\sin t)(t^2+3)'}{(t^2+3)^2}$$

$$\frac{dq}{dt} = \frac{(4\cos t)(t^2+3) - (4\sin t)(2t)}{(t^2+3)^2}$$