Math 220 (section AD?) **Quiz 5** **Fall 2012**

Name SOLUTIONS

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

1. (3 points) Compute $\frac{dw}{dq}$ given that $w^2q^3 = \sin\left(w^2\right) + q^5$.

$$\frac{d}{dq}(w^2q^3) = \frac{d}{dq}(\sin(w^2)+q^5)$$

$$\frac{d}{dq}(w^2)\cdot q^3 + w^2\cdot\frac{d}{dq}(q^3) = \cos(w^2)\cdot\frac{d}{dq}(w^2) + 5q^4$$

$$2w\cdot\frac{dw}{dq}\cdot q^3 + w^2\cdot 3q^2 = \cos(w^2)\cdot 2w\cdot\frac{dw}{dq} + 5q^4$$

$$2w\cdot\frac{dw}{dq}\cdot q^3 - \cos(w^2)\cdot 2w\cdot\frac{dw}{dq} = 5q^4 - 3w^2q^2$$

$$\frac{dw}{dq}\left(2wq^3 - 2w\cos(w^2)\right) = 5q^4 - 3w^2q^2$$

$$\frac{dw}{dq} = \frac{5q^4 - 3w^2q^2}{2wq^3 - 2w\cos(w^2)}$$

2. (2 points) Compute $f'(x)$ given that $f(x) = \tan^{-1}\left(x^3\right)$.

$$f'(x) = \frac{1}{1+(x^3)^2}\cdot(x^3)'$$

$$= \frac{1}{1+x^6}\cdot 3x^2$$

$$= \frac{3x^2}{1+x^6}$$

3. (3 points) Compute $h'(t)$ given that $h(t) = \ln\left(\tan\left(t^5 + 2t\right)\right)$.

$$h'(t) = \frac{1}{\tan(t^5+2t)} \cdot (\tan(t^5+2t))'$$

$$= \frac{1}{\tan(t^5+2t)} \cdot \sec^2(t^5+2t) \cdot (t^5+2t)'$$

$$= \frac{1}{\tan(t^5+2t)} \cdot \sec^2(t^5+2t) \cdot (5t^4+2)$$

4. (2 points) Compute $\frac{dy}{dx}$ given that $y = (\sec x)^{x^3}$.

$$\ln(y) = \ln\left((\sec x)^{x^3}\right)$$

$$\ln(y) = x^3 \cdot \ln(\sec x)$$

$$\frac{d}{dx}(\ln(y)) = \frac{d}{dx}(x^3 \cdot \ln(\sec x))$$

$$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{d}{dx}(x^3) \cdot \ln(\sec x) + x^3 \cdot \frac{d}{dx}(\ln(\sec x))$$

$$\frac{1}{y} \cdot \frac{dy}{dx} = 3x^2 \ln(\sec x) + x^3 \cdot \frac{1}{\sec x} \cdot (\sec x)'$$

$$\frac{dy}{dx} = y\left(3x^2 \ln(\sec x) + x^3 \cdot \frac{1}{\sec x} \cdot \sec x \tan x\right)$$

$$\frac{dy}{dx} = (\sec x)^{x^3}\left(3x^2 \ln(\sec x) + x^3 \tan x\right)$$