Name: Solutions

Math 105: Fall 2013
Quiz 5: October 25

Good Luck!

1. Determine whether $G(x)$ is an antiderivative of $g(x)$. (Justify your answer.)

$$G(x) = 2^x \cos(x), \qquad g(x) = 2^x \cos(x) - 2^x \sin(x)$$

$G'(x) = (\ln 2)\, 2^x \cos x - 2^x \sin x$

since $G'(x) \neq g(x)$, $G(x)$ is not an antiderivative of $g(x)$.

2. Compute the derivative of $f(x) = \left(e^{2x^3} + \sqrt[5]{x}\right)^{2013}$.

$f'(x) = 2013\left(e^{2x^3} + x^{1/5}\right)^{2012}\left(e^{2x^3} 6x^2 + \frac{1}{5}x^{-4/5}\right)$

3. Suppose $p(x)$ is a function such that $p(1) = 3$ and $p'(1) = 2$. Define $F(x) = \dfrac{\ln x}{p(x)} + p(x^5)$. Find $F'(1)$.

$$F'(x) = \frac{\frac{1}{x} p(x) - \ln(x)\, p'(x)}{(p(x))^2} + p'(x^5)\, 5x^4$$

$$F'(1) = \frac{1 \cdot p(1) - \ln(1)\, p'(1)}{[p(1)]^2} + p'(1^5)\, 5(1^4)$$

$$= \frac{3 - 0}{3^2} + p'(1) \cdot 5 = \frac{1}{3} + 10 = 10\frac{1}{3}$$