Math 1700 Summer 2013
Quiz 2
Thursday June 6 2013
No Work = No Credit

Name: ______________________ **Student Number:** ______________________

1. (5 points) Suppose $f(x) = 2x^3 + 3x^2 + 7x + 4$ and $a = 4$. Find $(f^{-1})'(a)$.

Solution:

Recall that:

$(f^{-1})'(a) = \frac{1}{f'(f^{-1}(a))}$.

We have that $a = 4$.

To find $f^{-1}(4)$, we set $f(x) = 4$, getting:

$2x^3 + 3x^2 + 7x + 4 = 4$

$2x^3 + 3x^2 + 7x = 0$

$x(2x^2 + 3x + 7) = 0$

We may assume that the function is one to one. Then $x = 0$ is the unique solution.

So, $f^{-1}(4) = 0$.

Next, $f(x) = 2x^3 + 3x^2 + 7x + 4$ implies $f'(x) = 6x^2 + 6x + 7$.

So, $f'(0) = 7$.

So, $(f^{-1})'(4) = \frac{1}{f'(f^{-1}(4))} = \frac{1}{f'(0)} = \frac{1}{7}$.

2. (5 points) Use logarithmic differentiation to find the derivative of the function:

$$y = (x^2 + 2)^2(x^4 + 4)^4$$

.

Solution:

$y = (x^2 + 2)^2(x^4 + 4)^4$

...show all work...show all work...show all work...show all work...show all work...show all work...

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$$\ln(y) = \ln((x^2+2)^2(x^4+4)^4)$$

$$\ln(y) = \ln((x^2+2)^2) + \ln((x^4+4)^4)$$

$$\ln(y) = 2\ln((x^2+2)) + 4\ln((x^4+4))$$

$$\frac{d}{dx}[\ln(y)] = \frac{d}{dx}[2\ln((x^2+2))] + \frac{d}{dx}[4\ln((x^4+4))]$$

$$\frac{1}{y}\frac{d}{dx}[(y)] = 2\frac{d}{dx}[\ln((x^2+2))] + 4\frac{d}{dx}[\ln((x^4+4))]$$

$$\frac{1}{y}\frac{d}{dx}[(y)] = 2\frac{1}{(x^2+2)}\frac{d}{dx}[(x^2+2)] + 4\frac{1}{(x^4+4)}\frac{d}{dx}[(x^4+4)]$$

$$\frac{1}{y}\frac{d}{dx}[(y)] = 2\frac{1}{(x^2+2)}(2x) + 4\frac{1}{(x^4+4)}(4x^3)$$

$$\frac{d}{dx}[(y)] = y[2\frac{1}{(x^2+2)}(2x) + 4\frac{1}{(x^4+4)}(4x^3)]$$

$$\frac{d}{dx}[(y)] = (x^2+2)^2(x^4+4)^4[2\frac{1}{(x^2+2)}(2x) + 4\frac{1}{(x^4+4)}(4x^3)]$$