Math 124 Section 16 **QUIZ 3** Solutions **Sep 26, 2007**

Show your work in all problems.

1. Find the formula of the function $y = g(x)$ whose graph is obtained by first shifting $f(x) = x^2 - 4x^3$ to the right by 2 units and then stretching it vertically by a factor of 3.

$$x^2 - 4x^3 \xrightarrow[\text{shift right}]{} (x-2)^2 - 4(x-2)^3 \xrightarrow[\text{vertical stretch}]{} 3\left((x-2)^2 - 4(x-2)^3\right)$$

2. Write the following power functions in standard form: $y = k \cdot x^p$

(a) $y = (2x)^5 = 2^5 \cdot x^5 = 32 \cdot x^5$ $k = 32$, $p = 5$

(b) $y = \dfrac{1}{4x^5} = \dfrac{1}{4} \cdot \dfrac{1}{x^5} = \dfrac{1}{4} \cdot x^{-5}$ $k = .25$, $p = -5$

3. Given $f(x) = 3^x$, estimate $f'(2)$ accurate up to 3 decimals (using at least 2 different intervals from the left and from the right).

$f'(2) \approx$ ave.r.o.c. on a very short interval containing $x = 2$

ave r.o.c. on $[a,b]$ $= \dfrac{f(b) - f(a)}{b-a} = \dfrac{3^b - 3^a}{b-a} = \dfrac{3^b - 3^2}{b-2}$

$a = 2$,

h	b = a+h	ave.r.o.c
.01	2.01	9.94202
.0001	2.0001	9.88805
.000001	2.000001	9.88751
-.000001	1.999999	9.88750
-.0001	1.9999	9.88696
-.01	1.99	9.83339

gets closer to 0

gets close to 0

estimate:

$f'(2) \approx 9.8875$

actual value:

$f'(2) = \ln(3) \cdot 3^2$

$= 9.8875105\ldots$