Math 124 Section 2 **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 $f(x) = x^3 - 2x$ to the right by 1 unit and then stretching it vertically by a factor of 5.

$$x^3 - 2x \xrightarrow[\text{shift right}]{} (x-1)^3 - 2(x-1) \xrightarrow[\text{stretch vertically}]{} 5\left((x-1)^3 - 2(x-1)\right)$$

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

(a) $y = (3x)^4 = 3^4 \cdot x^4 = 81 \cdot x^4$, $k = 81$, $p = 4$

(b) $y = \dfrac{1}{5x^3} = \dfrac{1}{5} \cdot \dfrac{1}{x^3} = \dfrac{1}{5} \cdot x^{-3}$, $k = .2$ $p = -3$

3. Given $f(x) = 5^x$, 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 $[a,b]$ $= \dfrac{f(b) - f(a)}{b-a} = \dfrac{5^b - 5^a}{b-a} = \dfrac{5^b - 5^2}{b-2}$

$a = 2$,

h	b=a+h	ave.r.o.c
.01	2.01	40.5614
.0001	2.0001	40.2391
.000001	2.000001	40.2359
-.000001	1.999999	40.2359
-.0001	1.9999	40.2327
-.01	1.99	39.9138

gets closer to 0 (first three rows)

gets close to 0 (last three rows)

estimate:

$f'(2) \approx 40.2359$

actual value:

$f'(2) = \ln(5) \cdot 5^2$

$= 40.235947...$