Practice Exam for Midterm 2

1. Differentiate $\ln(\sqrt{873 \sin x})$.

2. Find $\frac{d^3}{dx^3}(x^3 \ln x)$.

3. Differentiate $x^{(1/x)}$.

4. A table of values for $f(x)$, $g(x)$, $f'(x)$ and $g'(x)$ is given. If $h(x) = f(g(x))$, find $h'(1)$.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	1	7
2	1	4	5	2
3	3	1	3	1

5. Find dy/dx if $y = \sin(x + y)$.

6. If $xyz = 6$, $dx/dt = 5$ and $dy/dt = 4$, find dz/dt when $x = 1$ and $y = 2$.

7. The radius of a circular disk is measured to be 20cm with a possible error of .2cm. Estimate the possible error in computing the area of the disk.

8. Use the guidlines of section 4.5 to sketch the graph of $x\sqrt{4 - x^2}$.

9. Find
$$\lim_{x \to 1} \frac{\ln x}{\pi/4 - \tan^{-1} x}$$

10. Find
$$\lim_{x \to 1} \frac{\ln x}{\pi/3 - \tan^{-1} x}.$$

11. Find
$$\lim_{x \to \infty} (\ln(2x - 1) - \ln(x)).$$

12. Find all local and absolute minima and maxima of the function $f(x) = 2\sqrt{|x|} + x$ on $[-4, 4]$.

13. If $f(x)$ is continuous on $[0, 3]$, differentiable on $(0, 3)$, and $f(0) = 2$, $f(3) = -1$, which of the following are necessarily true?
(a) $f'(x) < 0$ for every point x in $(0, 3)$.
(b) $f'(x) < 0$ for at least one point x in $(0, 3)$.
(c) The function f is decreasing on $[0, 3]$.
(d) $f'(x) = -1$ for at least one point x in $(0, 3)$.