Math 1A   Calculus   Fall, 2004
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Practice Exam for Midterm 2—Solutions

1. Differentiate $e^x(\cos x + \sin x)$.

$$2e^x \cos x$$

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

$$(\cot x)/2$$

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

$$11 + 6\ln x$$

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

$$x^{(1/x)}x^{-2}(1 - \ln x)$$

5. 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

$h'(1) = f'(g(1))g'(1) = f'(2)g'(1) = 35$

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

$$\frac{\cos(x + y)}{1 - \cos(x + y)}$$

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

Solve the given equation for $z = 6/(xy) = 3$. Differentiate to get $xy\frac{dz}{dt} + xz\frac{dy}{dt} + yz\frac{dx}{dt} = 0$, so $2\frac{dz}{dt} + 12 + 30 = 0$, and $dz/dt = -21$.

8. 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.

$A = \pi r^2$, $dA = 2\pi r dr = 2\pi 20(.2) = 8\pi \approx 25\text{cm}^2$