

Name: \_\_\_\_\_

**MA2 Exam 2 Review Sheet**

All problems must be answered using calculus techniques. Final answers must be *exact* (not rounded), *in simplest form* and include appropriate *units* unless otherwise indicated. Put a box around your final answer. Graphing calculators, though not required, may be used on this exam, with the following exceptions: TI-89, TI-92, or any calculator with symbolic manipulation abilities.

1. Find  $\frac{dy}{dx}$  for each of the following:

a)  $y = \ln 5x$

b)  $y = \ln(x^2 - 8x + 3)$

c)  $y = \ln 4x^2$

d)  $y = \ln\left(\frac{e^x - 1}{e^x}\right)$

2. Given  $y = \ln x^4$ , find:

a) the slope of the tangent line to  $y = \ln x^4$  at  $x = e^3$ .

b) the equation of the tangent line to  $y = \ln x^4$  at  $x = e^3$ .

3. Find  $\frac{dy}{dx}$  in simplest form for each of the following:

a)  $y = \ln 4x^5$

b)  $y = \frac{1}{\ln x^2}$

c)  $y = \ln(\sin x)$

d)  $y = \sin^3(\ln 2x)$

e)  $y = \ln(\cos^3 5x^2)$

f)  $y = \cos^3(\ln 5x^2)$

g)  $y = e^{4x}$

h)  $y = e^{8x^3}$

i)  $y = x^4 e^x$

j)  $y = \frac{e^x}{\ln x}$

k)  $y = e^{-\frac{x}{3}}$

l)  $y = -5xe^x$

m)  $y = e^x \sec x^2$

n)  $y = e^x \sin 3x$

o)  $y = \frac{\cos^3(5x)}{e^x}$

p)  $y = \ln(\cos e^x)$

4. The concentration,  $C$ , of a certain drug in the bloodstream  $t$  minutes after being ingested is given by  $C(t) = e^{-t} - e^{-2t}$ .

a) Find the maximum concentration,  $C$ , of the drug.

b) After how many minutes does the maximum concentration occur?

5. A certain machine depreciates so that its value,  $V$ , after  $t$  years is  $V(t) = 20,000e^{-0.4t}$  dollars.

a) How fast is the value of the machine changing?

b) At what rate is the value of the machine changing after 5 years?

6. Find  $\frac{dy}{dx}$  in simplest form:

a)  $y = \ln(x \tan y)$

b)  $y = 2x + 3 \ln(2 + y^3)$

\*c)  $y = e^y + \ln(xy)$