

## MA2 Final Exam Review Sheet

The final exam will be given on **Tuesday, June 10, 2008**. *Graphing calculators are required on this exam.*

1. Evaluate each limit:

a)  $\lim_{x \rightarrow \infty} \frac{5x^3 - 3x + 1}{4x^2 - 2x^3 + 5}$

b)  $\lim_{x \rightarrow 3^+} \frac{5}{x - 3}$

2. Use the definition of the derivative to find  $f'(x)$  if  $f(x) = 4x^2 - x + 5$ .

3. Find  $k$  so that  $f(x) = \begin{cases} x^2 - 16, & x \neq 4 \\ k, & x = 4 \end{cases}$  is continuous for all  $x$ .

4. a) Find  $f'(x)$  if  $f(x) = \frac{x^5}{x^3 - 2}$ .

b) Find  $g'(x)$  if  $g(x) = x^3 \sin^2 5x$ .

5. a) If  $x^2 - 2xy + 3y^2 = 8$ , find  $\frac{dy}{dx}$ .

b) If  $f(x) = \sin^2 x$ , find  $f''(x)$ .

6. Write an equation of the line normal to the graph of  $y = 2e^{3x}$  at  $x = \frac{1}{3}$ .

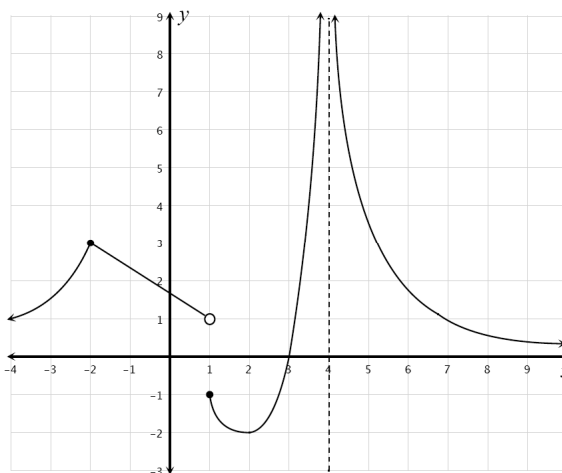
7. Given the graph of  $y = f(x)$  shown at right.

a)  $\lim_{x \rightarrow \infty} f(x) =$

b)  $\lim_{x \rightarrow 4} f(x) =$

c) State all values of  $x$  at which  $f(x)$  is not differentiable.

d)  $\lim_{x \rightarrow 1^-} f(x) =$



8. The acceleration of a particle moving along the  $x$ -axis at time  $t$  is given by  $a(t) = 4t - 12$ . If the velocity is 10 when  $t = 0$  and the position is 4 when  $t = 0$ , then at what time(s)  $t$  does the particle change direction?

9. Evaluate each indefinite integral:

a)  $\int x\sqrt{5x^2 - 4} dx$

b)  $\int 2 \tan x \sec^2 x dx$

c)  $\int 2xe^{x^2} dx$

10. If  $\int_{30}^{100} f(x) dx = A$  and  $\int_{50}^{100} f(x) dx = B$ , then find an expression for  $\int_{30}^{50} f(x) dx$  in terms of  $A$  and  $B$ .

11. Given the table of values below, approximate  $\int_0^4 f(x) dx$  using the Midpoint Rule with  $n = 2$  rectangles.

$x$	0	1	2	3	4
$f(x)$	0	1.2	4.3	6.5	1

12. Find the area of the region enclosed by  $y = 2x^2 - 4$  and  $y = \sqrt{9 - x^2}$ . Round your answer to three decimal places.

13. Find the area of the region bounded by the graphs of the equations  $y = x^2 + 1$  and  $y = 5$ .

14. Find the volume of the solid that is generated when the region enclosed by the curve  $y = x^2$  and the curve  $y = 5x$  is revolved about the  $x$ -axis. Set up but do not evaluate the integral.

15. Find the volume of the solid that is generated when the region enclosed by the curve  $x = 5 - y^2$  and the curve  $x = 1$  is revolved about the  $y$ -axis. Set up but do not evaluate the integral.