

# EXAM 2 REVIEW - MATH 101

The following is a review of the concepts you should know for this exam. This review is a sample and is not intended to mirror the exam questions. Any problems similar to those discussed in class or in assigned homework may also be assessed on the exam.

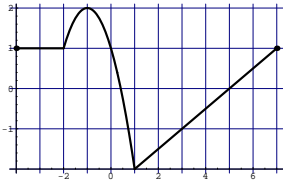
1. Given  $f(x) = 2x^2$ ,  $g(x) = 4 - 3x$  and  $j(x) = 2x - 5$ , find

- $(f + g)(x)$
- $(f - g)(x)$
- $\frac{g}{f}(-2)$
- $(g \cdot j)(x)$
- $\frac{f(x+h) - f(x)}{h}$

2.  $f(x) = \frac{1 - 2x}{4x + 5}$

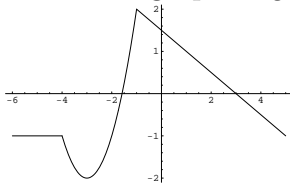
- Find  $f(-3)$
- If  $f(x) = -\frac{1}{3}$ , find  $x$ .
- What is the domain of  $f(x)$ ?
- Find the  $x$ -intercept(s).
- Find the  $y$ -intercept.

3. Given the complete graph of  $f(x)$ :



- What is the domain? What is the range?
- Find  $f(3) - f(1)$ .
- For what values of  $x$  does  $f(x) = 0$ ?
- Sketch the graph of  $-f(x + 2)$ .

4. Given the graph of  $g(x)$ :



- List the intervals over which  $g(x)$  is increasing, decreasing, or constant.
- List the coordinates of the local maxima and local minima, if any.

5. Sketch the graph of

$$f(x) = \begin{cases} x & \text{if } -3 \leq x \leq 1 \\ (x-2)^2 & \text{if } 1 < x < 4 \\ 2 & \text{if } x \geq 4 \end{cases}$$

Find:

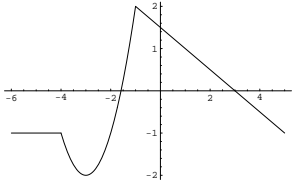
- a)  $f(-2)$   
b)  $f(5)$   
c) What is the domain of  $f$ ?
6. Sketch the graph that results from transforming  $f(x) = |x|$  by stretching vertically by a factor of 2 and shifting 3 units up.
7. Use a graphing calculator to find the real zeros (if any) and the local maxima and local minima for the function below. Round to two decimal places if needed.

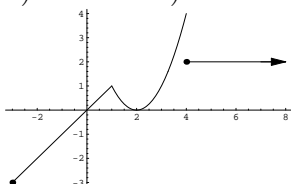
$$f(x) = -.35x^4 + 1.48x^3 - 1.75x + 2.62$$

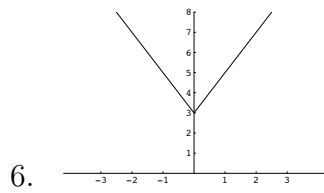
8. A wire of length  $x$  is bent into a square. Express the area of the square as a function of  $x$ .
9. Suppose that an open box with a rectangular base is to be made from a rectangular piece of cardboard 18 inches by 14 inches by cutting out a square from each corner and turning up the sides.  
a) Express the volume  $V$  of the box as a function of the length  $x$  of the side of the square cut out from each corner.  
b) Find the volume if a 4 inch square is cut out.
10. Suppose that the quantity supplied  $S$  and quantity demanded  $D$  of baseball caps at a major league game are given by the functions  $S(p) = 2940 - 100p$  and  $D(p) = 110p$ , where  $p$  is the price. Find the equilibrium price for caps at the game. Then find the equilibrium quantity.
11. Fantastic Fone, Inc. charges an access fee of \$19.95 plus \$4.32 per minute for each minute after the first three minutes on all international calls. Express the total charges,  $C$ , incurred as a function of the number of minutes,  $x$ , used for a phone call to London.
12. Use factoring to find the zeros of the quadratic function. List the  $x$ -intercepts of the graph of the function.  
a)  $f(x) = 3x^2 - 4x - 15$   
b)  $g(x) = 25x^2 - 1$   
c)  $h(x) = 2x^2 - 4x$
13. Find the zeros of the quadratic function using the Square Root Method. List the exact  $x$ -intercepts of the graph of the function.  
a)  $f(x) = 4(x+3)^2 - 25$   
b)  $g(x) = 3(x-2)^2 - 1$

14. Find the zeros of the quadratic function by completing the square. List the exact  $x$ -intercepts of the graph of the function.
- a)  $f(x) = x^2 - 14x + 41$   
 b)  $g(x) = 2x^2 - 6x + 15$
15. Use  $u$ -substitution to transform the function into quadratic form. Then find the zeros of the function. List the exact  $x$ -intercepts of the graph of the function.
- a)  $f(x) = (1 - 7x)^2 - 2(1 - 7x) - 8$   
 b)  $g(x) = x + 3\sqrt{x} - 10$
16. The graph of  $f(x) = mx + b$  is increasing if
- a)  $m < 0$       b)  $m > 0$   
 c)  $b > 0$       d) never increasing
17. Compared to the graph of  $f(x)$ , the graph of  $g(x) = f(x + 4)$  is shifted
- a) down 4 units      b) up 4 units  
 c) right 4 units      d) left 4 units
18. To complete the square for  $x^2 - 6x$ , you would
- a) add 6      b) add 9  
 c) subtract 9      d) add 1

**Answers:**

1. a)  $2x^2 - 3x + 4$     b)  $2x^2 + 3x - 4$     c)  $\frac{5}{4}$     d)  $-6x^2 + 23x - 20$     e)  $4x + 2h$
2. a)  $-1$     b)  $x = 4$     c) all real numbers except  $x = -\frac{5}{4}$     d)  $\frac{1}{2}$     e)  $\frac{1}{5}$
3. a)  $D : [-4, 7]; R : [-2, 2]$     b) 1    c)  $1/2, 5$     d) 
4. a) Inc:  $(-3, -1)$  Dec:  $(-4, -3), (-1, 5)$  Constant:  $(-6, -4)$     b) Maximum is 2 at  $x = -1$ , Minimum is -2 at  $x = -3$
5. a)  $-2$     b) 2    c)  $[-3, \infty)$





7.  $x$ -int(s):  $-1.37, 4.04$  ; Maximum:  $8.99$  at  $x = 3.04$  and  $3.31$  at  $x = -.58$ ;  
Minimum:  $1.82$  at  $x = .71$
8.  $A(x) = \frac{x^2}{16}$
9. a)  $V(x) = (18 - 2x)(14 - 2x)x$       b)  $V(4) = 240$  cubic inches
10.  $p = \$14$ , Quantity = 1540 baseball caps
11.  $C(x) = 19.95 + 4.32(x - 3)$
12. a)  $-\frac{5}{3}, 3$       b)  $\pm\frac{1}{5}$       c)  $0, 2$
13. a)  $-\frac{1}{2}, -\frac{11}{2}$       b)  $2 \pm \frac{\sqrt{3}}{3}$
14. a)  $-\frac{5}{2} \pm \frac{\sqrt{15}}{2}$       b)  $1 \pm \frac{\sqrt{30}}{3}$
15. a)  $\pm\frac{3}{7}$       b)  $4$
16.  $b$
17.  $d$
18.  $b$