# Math 96 Final Review Sheet

**Graphing: Find a complete graph of the functions below, plotting at least 3 points and finding any major characteristic points (vertex, asymptotes, etc.)**
**Find the Domain and Range of #1-15 too.**

1) $y = 2x^2 - 8x - 1$ also find the vertex, x & y-intercepts, axis of symmetry, max/min
2) $f(x) = 2^{x-1}$
3) $g(x) = \log_2 x$
4) $f(x) = \sqrt{x-5}$
5) $f(x) = |x+1| - 2$
6) $f(x) = -3x^2 + 6x + 1$ also find vertex, x & y-intercepts, axis of symmetry, max/min
7) $g(x) = -(x+3)^2 - 2$ also find vertex, x & y-intercepts, axis of symmetry, max/min
8) $y = (\frac{1}{3})^{-x}$
9) $f(x) = e^x - 1$
10) $y = -\ln x$
11) $y = -\sqrt{x+1} - 1$
12) $f(x) = \log_5 x + 4$
13) $f(x) = \frac{1}{2}(x+3)^2 - 1$ also find vertex, x & y-intercepts, axis of symmetry, max/min
14) $6x - 9y + 18 = 0$
15) $f(x) = \left(\frac{1}{2}\right)^x - 1$
16) $3x - 2y \leq 8$

**Graph the solution set to the system of inequalities:**

17) $2x + y \leq 1$ and $x + y \geq 1$

18) $x \leq 0$
$y \geq 0$
$y \geq x + 2$
$y \leq -x + 1$

**Evaluate the following logs without using a calculator:**

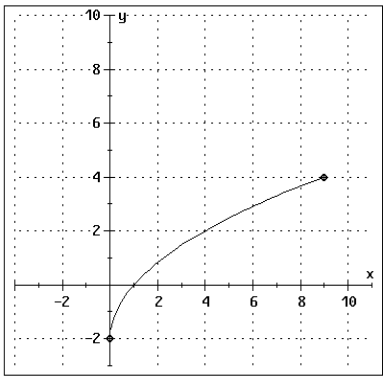
19) a) $\log_4 16$ b) $\log_5 \frac{1}{5}$ c) $\log_6 \sqrt{6}$ d) $\log(\frac{1}{100})$
e) $\log_6 1$ f) ln e g) ln $e^2$ h) ln $\frac{1}{e}$
i) ln 1 j) $\log(\sqrt{10})$

## Solve the following multiple choice questions:

20) If $f$ is the function $f = \{(-2,3),\ (-1,2),\ (0,5),\ (1,\ 2),\ (5,\ 0)\}$.
Then the range of $f$ is:

a) $\{-2,-1,0,1,5\}$ b) $[-2,5]$ c) $[0,5]$ d) $\{0,\ 2,\ 3,\ 5\}$

21) The domain of the function represented by the accompanying graph is




a) $[0,\ 9]$ b) $[-2,4]$ c) $\{-2,-1,0,1,2,3,4\}$ d) $\{0,1,2,3,4,5,6,7,8,9\}$

22) Which of the following is a function.

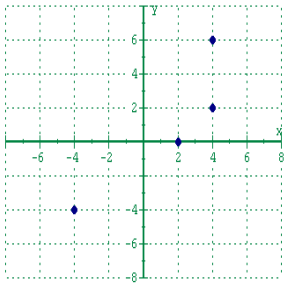
I.

| $x$ | $y$ |
|---|---|
| 2 | 4 |
| 2 | 5 |
| 3 | 6 |

II.

| $x$ | $y$ |
|---|---|
| 1 | 2 |
| 2 | 2 |
| 3 | 2 |

III. $\{(1,\ 2),\ (2,\ 1)\}$ IV.




a) I only b) I and III only c) II only d) II and III only e) I, III, and IV

23) Let $f$ be the function $\{(\ 2,3\ ),\ (\ -1,4\ ),\ (\ 0,6\ ),\ (\ 1,\ 2\ ),\ (\ 5,\ 0\ )\}$.
The argument having an image 2 is

a) 3 b) $(2,3)$ c) $(1,2)$ d) 1

24) Express in interval notation: $x > -2$ AND $x < 3$

a) $(-2,\infty)$ b) $(-2,\ 3)$ c) $(-\infty,\ -2) \cup (3,\infty)$ d) $(-\infty,\ \infty)$ e) $\emptyset$

25) Express in interval notation: $x \leq 2$ OR $x < 6$
a) $[2,6)$ b) $(-\infty,\ 2]$ c) $(-\infty,6)$ d) $(-\infty,\ 2] \cup (6,\ \infty)$ e) $\emptyset$

**Solve the following equations or inequalities:**

26) $11 \leq \frac{3x+1}{2} < 18$

27) $3 - 4x < -1$ OR $3 - 4x \geq 9$

28) $(x+4)^2 = -32$

29) $2x^2 + 8x - 3 = 0$ Use the quadratic formula.

30) $y^2 + 20y = -6$ Use the quadratic formula.

31) $6x^2 - 27 = 0$

**Simplify the following expressions:**

32) $\dfrac{3+7i}{2-5i}$

33) $\left(\dfrac{1}{8}\right)^{-\frac{2}{3}}$

34) $i^{43}$

35) $\sqrt{-4}\sqrt{-36}$

36) $\sqrt[16]{y^4}$

37) $(2-3i)^2$

38) $\dfrac{\sqrt[3]{x}}{\sqrt[4]{x}}$

**Let $f(x) = 2x^2 - x + 5$. Find the following:**

39) $f(-2)$

40) $f(a+h)$

41) $f(a+h) - f(a)$

**Solve the following systems using any method:**

42)
$$\begin{aligned} 2x - 5y &= 12 \\ x + 4y &= 6 \end{aligned}$$

43)
$$\begin{aligned} x + y + z &= 1 \\ 2x + z &= 4 \\ -x + 2y + 4z &= 3 \end{aligned}$$

**Use matrices and row operations to solve this linear system.**

44)
$$\begin{aligned} 2x - y + 3z &= 13 \\ x + y - z &= -2 \\ 3x + 2y + 2z &= 13 \end{aligned}$$

## Solve the following application problems:

45) The cost $C$ in dollars of manufacturing $x$ compact discs is given by $C(x) = \frac{1}{2}x^2 - 600x + 200,000$.
   a) Find the number of compact discs that must be manufactured to minimize the cost.
   b) Find the minimum cost.

46) Eight flats of impatiens and two flats of marigolds cost $\$15.50$. Three flats of impatiens and five flats of marigolds cost $\$10.02$. Find the price per flat of each kind of flower.

47) The Pool Fun Company has learned that by pricing a newly released Fun Noodle at $3, sales will reach 10,000 Fun Noodles per day during the summer. Raising the price to $5 will cause the sales to fall to 8,000 Fun Noodles per day. Assuming that the relationship between sales price and number of Fun Noodles is linear,
   a. Write two ordered pairs given in this problem situation. Let $x$ represent price and let $y$ represent sales.
   b. Find the slope for the linear function.
   c. Interpret the slope.
   d. Write an equation in function form describing the relationship between price and sales.
   e. Find the $y$-intercept of your linear function.
   f. Interpret the meaning of the $y$-intercept in this problem situation.
   g. Find the $x$-intercept of your linear function.
   h. Interpret the meaning of the $x$-intercept in this problem situation.
   i. Graph the function for the problem situation on the previous page.
   j. Write the implied domain and range of this function.

48) The model $A = 1.6e^{.039t}$ gives the minimum wage, $A$, in year $t$, where $t = 0$ represents the year 1970. Use the model to find the minimum wage in the year 1990.

49) Inver Hills Community College has decided to supply the learning center with color monitors. A meeting with the supplier has led to the following information. 4 CGA monitors and 6 VGA monitors can be purchased for $4600, while 6 CGA monitors and 4 VGA monitors will cost $4400. What are the prices of a single CGA monitor and a single VGA monitor?

50) The linear function $y = -0.4x + 38$ models the percentage of U.S. men, $y$, smoking cigarettes $x$ years after 1980.
   a) Find and interpret the meaning of the slope.
   b) Find and interpret the meaning of the y-intercept.
   c) Predict the percentage of U.S. men who will be smoking in 2010.

51) A building measures a height of 500 feet. A ball is thrown upward from the top of the building with an initial velocity of 10 feet per second. The height of the ball $h$ in feet after $t$ seconds is given by the equation:

$$h(t) = -16t^2 + 10t + 500$$

a) Find the maximum height of the ball.
b) Find when the ball will hit the ground.

## Solve the following Sequences and Series problems:

52) Expand and evaluate: $\sum_{i=0}^{3}(-1)^i i!$

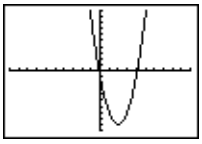
53) $-2, 3, 8, 13, \ldots$

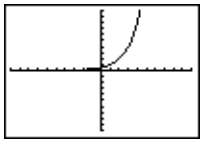
a) $a_{30} =$ _____
b) $S_{30} =$ _____

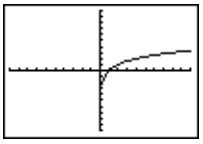
54) $1, -4, 16, -64, \ldots$

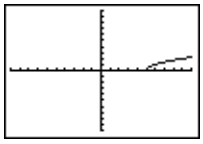
a) $a_{12} =$ _____
b) $S_{12} =$ _____

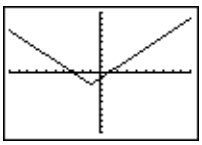
## Answers:

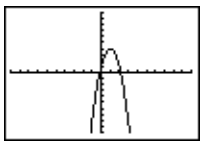
1) 
V(2,-9)
x-int: 4.121, -.121
y-int: -1
AOS: x = 2
min of -9
D: $(-\infty, \infty)$
R: (-9, $\infty$)

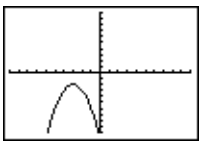
2) 
D: $(-\infty, \infty)$
R: $(0, \infty)$

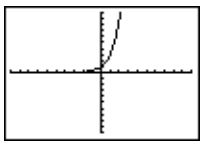
3) 
D: $(0, \infty)$
R: $(-\infty, \infty)$

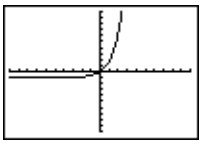
4) 
D: $[5, \infty)$
R: $[0, \infty)$

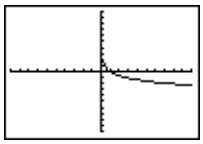
5) 
D: $(-\infty, \infty)$
R: $(-2, \infty)$

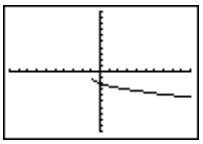
6) 
V(1,4)
x-int: -.155, 2.155
y-int: 1
AOS: x = 1
max of 4
D: $(-\infty, \infty)$
R: $(-\infty,4)$

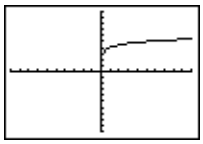
7) 
V(-3,-2)
x-int: none
y-int: -11
AOS: x = -3
max of -2
D: $(-\infty, \infty)$
R: $(-\infty,-2)$

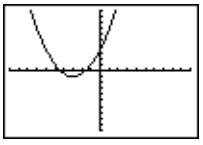
8) 
D: $(-\infty, \infty)$
R: $(0, \infty)$

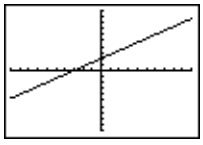
9) 
D: $(-\infty, \infty)$
R: $(-1, \infty)$

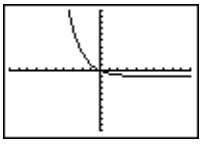
10) 
D: $(0, \infty)$
R: $(-\infty, \infty)$

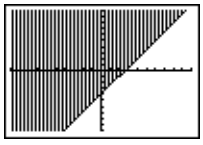
11) 
D: $(-1, \infty)$
R: $(-1, \infty)$

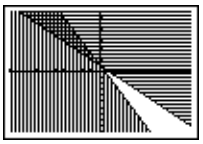
12) 
D: $(0, \infty)$
R: $(-\infty, \infty)$

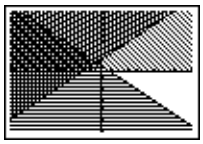
13) 
V(-3,-1)
x-int: -1.58, -4.41
y-int: 3.5
AOS: x = -3
min of -1
D: $(-\infty, \infty)$
R: $(-1,\infty)$

14) 
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

15) 
D: $(-\infty, \infty)$
R: $(-1, \infty)$

16) 

17) 

18)  (Quadrant II region only)

19) a) 2 b) -1 c) $\frac{1}{2}$ d) -2 e) 0 f) 1 g) 2 h) -1 i) 0 j) $\frac{1}{2}$

20) d

21) a

22) d

23) d

24) b

25) c

26) $[7, \frac{35}{3})$

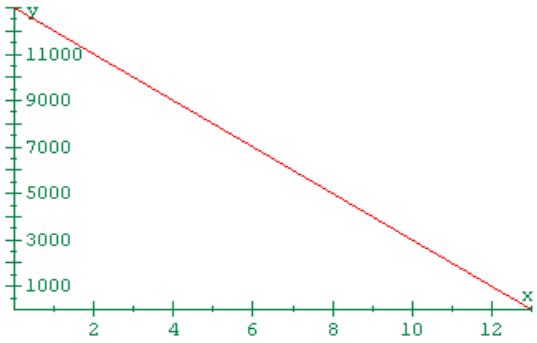
27) $\left(-\infty, -\frac{3}{2}\right) \cup (1, \infty)$

28) $-4 \pm 4i\sqrt{2}$

29) $\frac{-4\pm\sqrt{22}}{2}$
30) $-10 \pm \sqrt{94}$
31) $\pm \frac{3\sqrt{2}}{2}$

32) $-1+i$
33) $4$
34) $-i$
35) $-12$
36) $\sqrt[4]{y}$
37) $-5-12i$
38) $\sqrt[12]{x}$
39) $15$
40) $2a^2+4ah+h^2-a-h+5$
41) $4ah+h^2-h$

42) (6,0)
43) $(1, -2, 2)$
44) (1,1,4)
45) a) $600$ discs must be manufactured to minimize the cost.
b) The minimum cost is $\$20,000$.
46) The price per flat is $\$1.69$ for the impatiens and $\$.99$ for the marigolds.
47) a. $(3, 10000); (5, 8000)$ b. $-1000$
c. Sales decrease by $1000$ Fun Noodles for every $\$1$ increase in price
d. $f(x) = -1000x + 13,000$ e. $(0, 13000)$
f. If you give away the Fun Noodles, you will give away $13000$ of them.
g. $(13, 0)$ h. If the price of Fun Noodles is $\$13$, you won't sell any.
i.




j. Domain:$[0, 13]$; Range: $[0, 13000]$
48) $3.49
49) $CGA$ = $400, VGA = $500
50a) The percentage of U.S. male smokers is going down by .4% each year after 1980.
50b) There were 38% of U.S. male smokers in 1980.
50c) 26%
51a) 501.5625 feet
51b) 5.911 sec

52) -4

53a) 143 53b) 2115

54a) -4194304 54b) -3355443