

The best 20 of these 21 problems will count 5 points each

1. Is the relation $\{(-3, 4), (-2, -2), (1, 8), (3, 8), (7, 13)\}$ a function? Why or why not?

Yes it is a fnc. since None of x values repeat

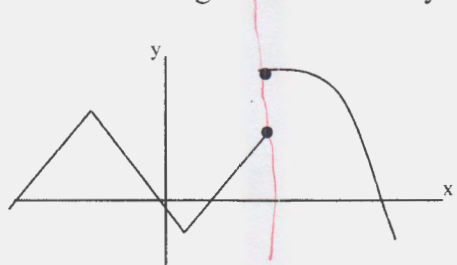
2. If $f(x) = 5x^2 + 7x + 1$ find $f(2x + 3)$ [SET UP ONLY]

$$5(2x+3)^2 + 7(2x+3) + 1$$

3. Graph $f(x) = \begin{cases} x^2 & -3 \leq x < 1 \\ 3x - 1 & x \geq 1 \end{cases}$ See graph paper

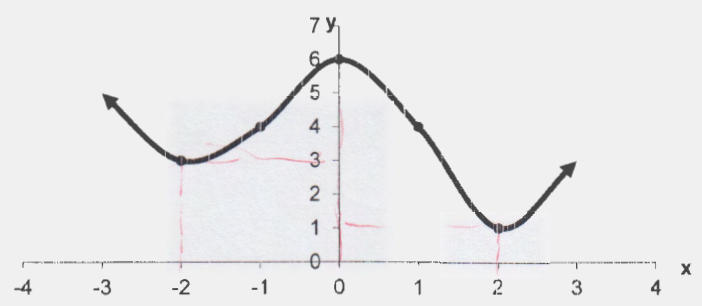
4. What is the domain for $y = \frac{3x-2}{x^2-7x+12}$? $\frac{3x-2}{(x-4)(x-3)}$ $x \neq 3, 4$

5. Is the following a function? Why or why not?



No it fails the Vertical Line Test

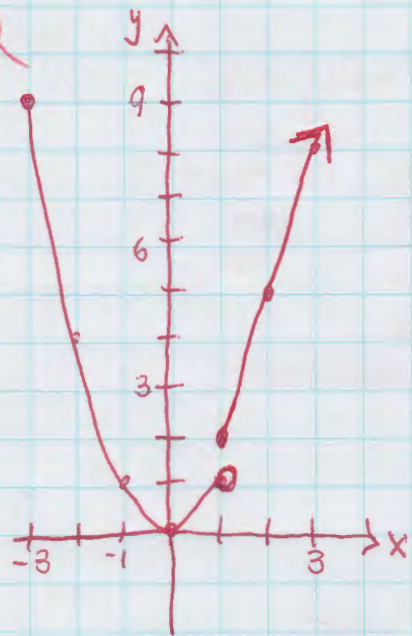
6. Given the graph below give the intervals the graph is increasing and decreasing. Also give the local maximum and minimum.



Dec $(-\infty, -2) \cup (0, 2)$ Local mins at $(2, 1)$ $(-2, 3)$
 Inc $(-2, 0) \cup (2, \infty)$
 Local max $(0, 6)$

MATH 114 Sample Test 2

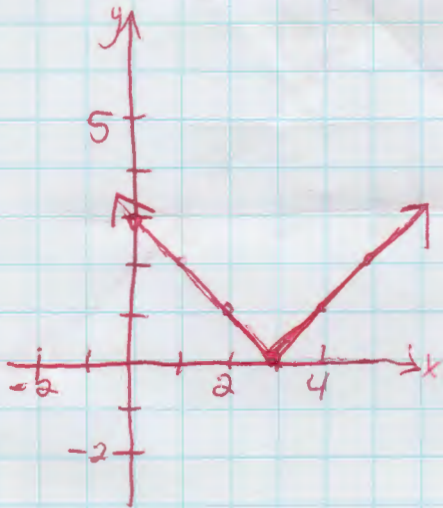
③ $f(x) = \begin{cases} x^2 & -3 \leq x < 1 \\ 3x-1 & x \geq 1 \end{cases}$



⑧ $y = |x-3|$

0	3
1	2
2	1
3	0
4	1
5	2

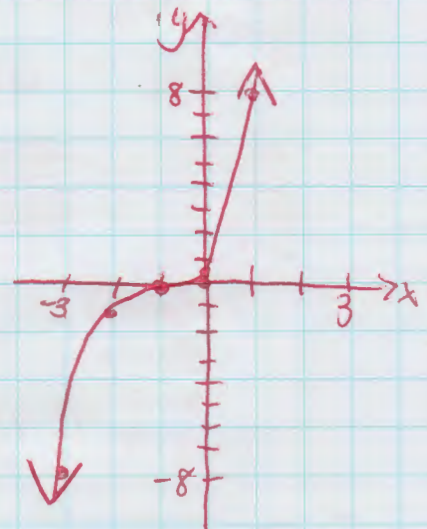
V shape
right 3
units



⑨ $y = (x+1)^3$

x^3 moves
left + 1 unit

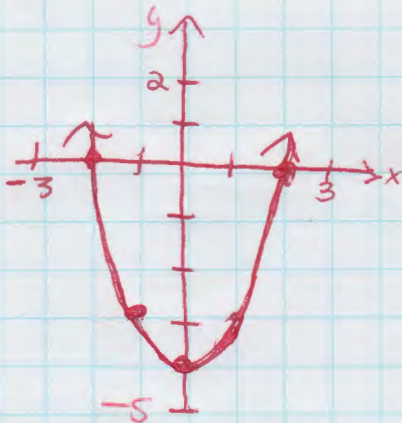
x	
-3	-8
-2	-1
-1	0
0	1
1	8



⑩ $y = x^2 - 4$

U
moves
down
4 unit

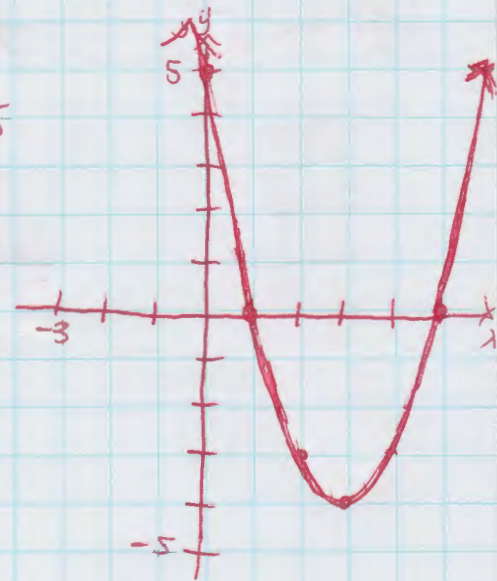
-2	0
-1	-3
0	-4
1	-3
2	0



⑪ $y = x^2 - 6x + 5$
 $(x-1)(x-5)$

Axis $x = \frac{-(-6)}{2(1)} = 3$

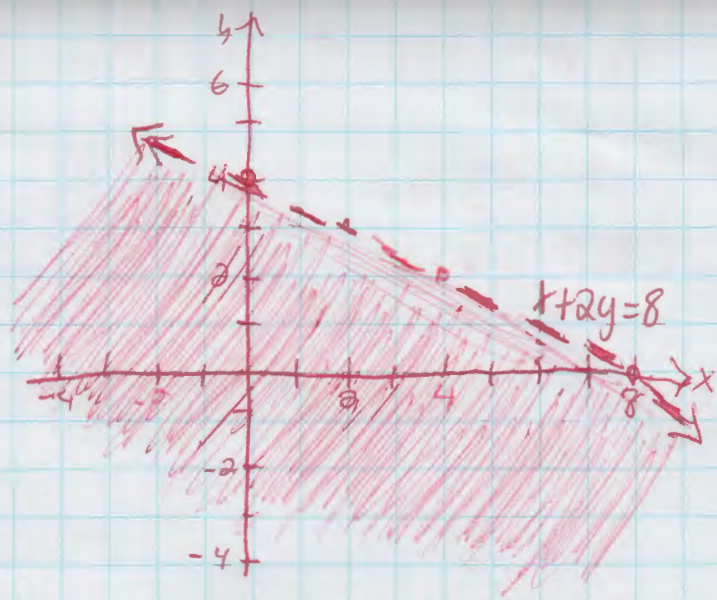
V(3, -4)
x intercepts 1, 5
y intercept 5



15) $x + 2y < 8$

8	0	Test (6, 0) $0 + 2(6) < 8$ $0 < 8$ True
0	4	
4	2	

dashed
Shade toward origin



16) $x \geq 0$
 $y \geq 0$

$x + y \leq 6$ $y \geq x + 2$

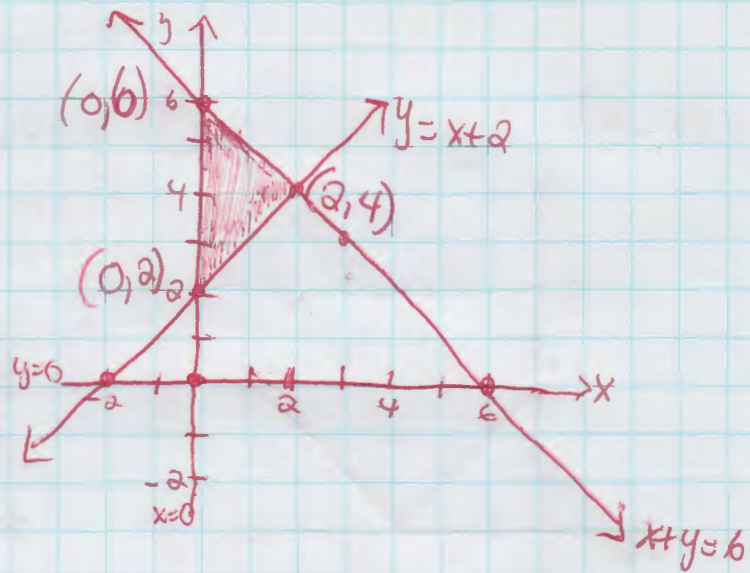
0	6	-2	0
6	0	0	2
3	3	1	3

$x + (x + 2) = 6$

$2x = 4$

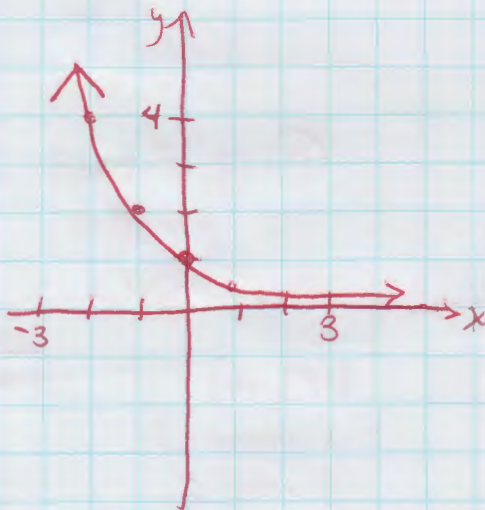
$x = 2$

$y = 4$ (2, 4)



19) $y = 2^{-x}$

-2	4
-1	2
0	1
1	1/2
2	1/4



7. Explain whether $y = x^4 + 2x^2$ is an even or odd function.

$$\begin{aligned} (-x)^4 + 2(-x)^2 \\ x^4 + 2x^2 \end{aligned}$$

even fnc. (symm about y)
 can replace x by $(-x)$ $f(x) = f(-x)$

- ✓ 8. Graph $y = |x - 3|$ *see graph paper*
- ✓ 9. Graph $y = (x + 1)^3$ *see graph paper*
- U 10. Graph $y = x^2 - 4$ *see graph paper*
- U 11. Graph $y = x^2 - 6x + 5$ *see graph paper*

12. Solve by using the substitution method $4x + 3y = 10$
 $3x - y = 1$

$$\begin{aligned} 4+6=10 \checkmark \\ 3-2=1 \checkmark \end{aligned}$$

$$y = 3x - 1$$

$$x = 1$$

$$y = 3(1) - 1 = 2$$

$$\begin{aligned} 4x + 3(3x - 1) &= 10 \\ 4x + 9x - 3 &= 10 \\ 13x &= 13 \end{aligned}$$

(1, 2)

13. Solve by using the elimination method (addition/subtraction)

$$\begin{aligned} 3(3x - 4y = 7) \\ 4(2x + 3y = 16) \end{aligned}$$

$$\begin{aligned} 9x - 12y &= 21 \\ 8x + 12y &= 64 \end{aligned}$$

$$\begin{aligned} 17x &= 85 \\ x &= 5 \end{aligned}$$

$$\begin{aligned} 3(5) - 4y &= 7 \\ -4y &= -8 \\ y &= 2 \end{aligned}$$

(5, 2)

$$2(5) + 3(2) = 16 \checkmark$$

14. Mr. Smith wants to make a mixture of nuts to sell for \$7.50 per pound. He mixes some of nut A which sells for \$5 per pound and some of nut B that sells for \$8 per pound. How many pounds of each type of nut should be used if there is to be 120 pounds of mixture?

$$\begin{aligned} A + B &= 120 \\ 5A + 8B &= 7.50(120) = 900 \end{aligned}$$

$$\begin{array}{r} 5A + 8B = 900 \\ - 5A + 5B = 600 \\ \hline \end{array}$$

$$3B = 300$$

$$B = 100$$

$$A = 20$$

20 lbs of Nut A and 100 lbs of Nut B are mixed.

15. Graph $x + 2y < 8$ *see graph paper*

16. Graph the solution to the system of inequalities $x \geq 0, y \geq 0, x + y \leq 6, y \geq x + 2$

See graph paper

17. Using your information from problem 16 Maximize $C = 5x + 2y$

If you did not do Problem 16 then use the following random ordered pairs

$\{(0, 2) (2, 4) (3, 6) (4, 7)\}$

$C(0,2) = 5(0) + 2(2) = 4$

$C(0,6) = 5(0) + 2(6) = 12$

$C(2,4) = 5(2) + 2(4) = 18$

MAX 18 at (2, 4)

$(x-2)^5 + 4 = y$

$f^{-1}(x) = (x-2)^5 + 4$

18. Find $f^{-1}(x)$ if $f(x) = \sqrt[5]{x-4} + 2$

$y = \sqrt[5]{x-4} + 2$

$x = \sqrt[5]{y-4} + 2$

$x-2 = \sqrt[5]{y-4}$

$(x-2)^5 = y-4$

19. Graph the exponential function: $y = 2^{-x}$ *see graph paper*

20. How much interest is earned if \$125,000 is compounded quarterly at 2% compounded quarterly for 10 years?

$125,000(1 + \frac{0.02}{4})^{40} - 125,000$

$152,599.28 - 125,000$

$27,599.28$

\$27,599.28 interest

21. How much is \$250,000 worth if compounded continuously at 2.25% for nine years?

$250,000e^{(0.0225)(9)}$

$250,000e^{0.2025}$

\$306,115.02

Formulas:

$x = -b/2a$

$A = P(1 + r/n)^{nt}$

$A = Pe^{rt}$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$