


Math 90 - Exam 1

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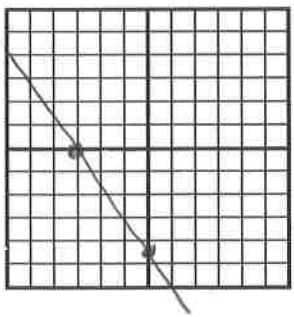
Name Key

1. Solve the inequality, writing your solution in interval notation.

$$\begin{aligned}
 & -7x + 20 \leq -2x \\
 & +7x \quad +7x \\
 & \frac{20}{5} \leq \frac{5x}{5} \\
 & 4 \leq x \\
 & x \geq 4 \\
 & [4, \infty)
 \end{aligned}$$


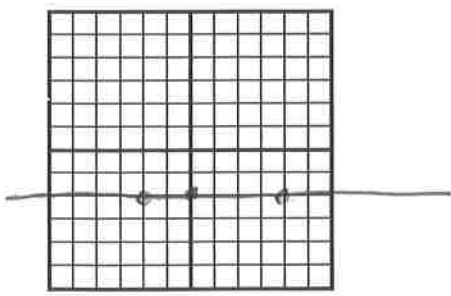
2. Give the intercepts and graph of the equation:  $3x + 2y = -9$

x-intercept  $(-3, 0)$       $y=0 \Rightarrow 3x = -9, x = -3$   
 y-intercept  $(0, -4.5)$       $x=0 \Rightarrow 2y = -9, y = -4.5$



3. Graph the equation  $y = -2$

$\rightarrow$  horizontal line at -2



slow way: plot points

x	y
0	-2
5	-2
-2	-2

4. Find the equation of the line passing through the points  $(6, -2)$  and  $(5, 0)$

$$m = \frac{0 - (-2)}{5 - 6} = \frac{2}{-1} = -2$$

$(y - y_1) = m(x - x_1)$  Choose  $(5, 0)$  as pt

$$y - 0 = -2(x - 5) ; y = -2x + 10$$

or Long Div. 2

5. Divide:  $\frac{x^3 + 5x^2 - x - 15}{x+2}$

$$\begin{array}{r} x^2 + 3x - 7 - \frac{1}{x+2} \\ x+2 \overline{) x^3 + 5x^2 - x - 15} \\ \underline{-(x^3 + 2x^2)} \phantom{-15} \\ 3x^2 - x \phantom{-15} \\ \underline{-(3x^2 + 6x)} \phantom{-15} \\ -7x - 15 \\ \underline{-(7x + 14)} \\ -1 \end{array}$$

Synthetic:  $-2 \overline{) 1 \quad 5 \quad -1 \quad -15}$

$$\begin{array}{r} -2 \quad -6 \quad 14 \\ 1 \quad 3 \quad -7 \quad -1 \\ x^2 + 3x - 7 - \frac{1}{x+2} \end{array}$$

6. Factor:  $x^3 + 8$

$$\begin{aligned} A^3 + B^3 &= (A+B)(A^2 - AB + B^2) \\ x^3 + 8 &= (x+2)(x^2 - 2x + 4) \\ \uparrow \quad \uparrow & \\ A=x \quad B=2 & \end{aligned}$$

7. Solve:  $3x^2 - 75 = 0$

$$\begin{aligned} 3(x^2 - 25) &= 0 \\ 3(x+5)(x-5) &= 0 \\ x &= -5, 5 \text{ formally: } \{-5, 5\} \end{aligned}$$

8. Find the values where  $\frac{x-7}{x^3 + 2x^2 - 15x}$  is undefined.

$$\begin{aligned} x(x^2 + 2x - 15) \\ x(x+5)(x-3) \end{aligned}$$

$x \neq 0, -5, 3$   
(undefined for  $0, -5, 3$ )

9. Multiply:  $\frac{x^2 + 7x + 12}{2x^2 + 6x} \cdot \frac{10x^3}{x^2 - 16} = \frac{(x+3)(x+4)}{2(x+3)} \cdot \frac{5 \cdot 10x^3}{(x+4)(x-4)}$

$$= \frac{5x^2}{x-4} \quad ; \quad x \neq -3, -4, 0, 4$$

10. Ed can paint a fence in 3 hours alone, and Andy can paint it in 4 hours alone. How long does it take them to paint the fence working together?

	$r$	$\cdot$	$t$	$=$	$w$
Ed	$\frac{1}{3}$		$x$		$\frac{x}{3}$
Andy	$\frac{1}{4}$		$x$		$\frac{x}{4}$
					<u>1 job done</u>

$$\frac{x \cdot 12}{3} + \frac{x \cdot 12}{4} = 1 \cdot 12 \quad \text{LCD} = 12$$

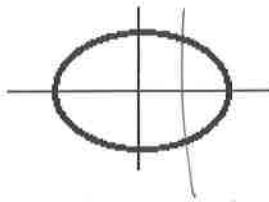
$$4x + 3x = 12$$

$$7x = 12, \quad x = 12/7 \text{ hr} \\ = 1\frac{5}{7} \text{ hr}$$

11. Write "yes" after each if it is a function; write "no" if it is not.

a) The set of ordered pairs  $\{(2, 0), (2, 5), (3, 1)\}$     no (same input  $\rightarrow$  2 outputs)

b) The graph:



no (fails vertical line test)

c) The equation  $y = x^2 + 1$

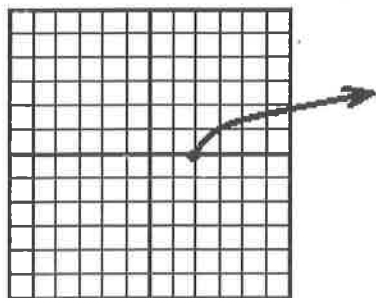
yes (all powers on  $x$  are odd)

12. For the function  $f(x) = x^2 + 7$ , find

a)  $f(4) = 4^2 + 7 = 16 + 7 = 23$

b)  $f(a+2) = (a+2)^2 + 7 = a^2 + 4a + 4 + 7 \\ = a^2 + 4a + 11$

13. For the graph below, give the domain and range:



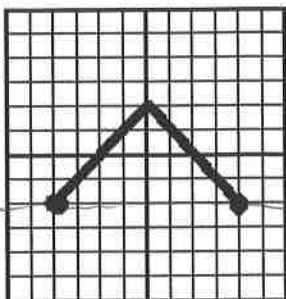
Domain:  $[2, \infty)$

Range:  $[0, \infty)$

Bonus (1 pt.): Write a function which describes the graph:

sq. root  $\sqrt{x}$ , shifted right 2 units  
 $f(x) = \sqrt{x-2}$

14. For the graph:



a) Give the value(s) of  $f(0)$

when  $x = 0$ ;  $y = 2$   $f(0) = 2$

b) Find value(s) of  $x$  for which  $f(x) = -2$

when  $y = -2$ ,  $x = -4$  and  $+4$

15. A piecewise function is defined as:

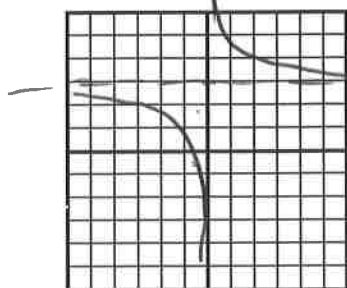
$$C(x) = \begin{cases} 2x & \text{for } x < 0 \\ -4 & \text{for } x \geq 0 \end{cases}$$

a) Find  $f(-3) = 2(-3) = -6$

b) Find  $f(0) = -4$

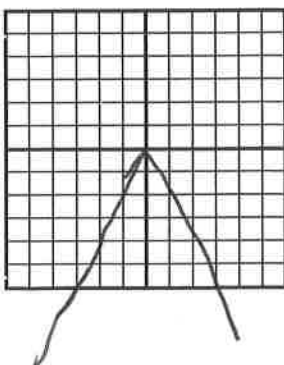
c) Find  $f(5) = -4$

16. Graph the equation:  $y = \frac{1}{x} + 3$



↑ shift up by 3

17. Graph the equation  $f(x) = -2|x|$



↑ steeper  
flip down