Math 125 **Test#1(Ch 7 and Ch 8)** **Name** Ivy Gonzalez

96

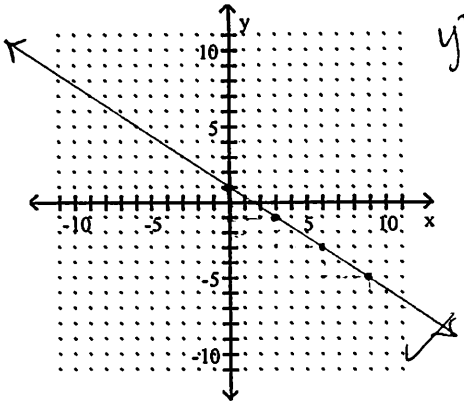
Show all work neatly and systematically for full credit. Total points: 100.

(4). Graph, then state its domain and range.

1) $f(x) = -\frac{2}{3}x+1$

$m = -\frac{2}{3}$

y intercept $= (0,1)$



Domain: $(-\infty,\infty)$

Range: $(-\infty,\infty)$ ✓

(4) Solve the formula for the specified letter.

2) $\frac{PV}{T} = \frac{pv}{t}$ for P

$(Tt)\frac{PV}{\cancel{T}} = \frac{pv}{\cancel{t}}(Tt)$

$\frac{\cancel{t}PV}{\cancel{t}\cancel{V}} = \frac{T(pv)}{tV}$

$P = \frac{T(pv)}{tV}$ ✓

(3) For the pair of functions, find the indicated sum.

3) Find $(f - g)(-3)$ when $f(x) = 2x^2 - 7$ and $g(x) = x - 7$.

$(f-g)(-3)$

$f(-3) - g(-3)$

$f(-3) = 2(-3)^2-7$

$= 2(9)-7$

$= 18-7$

$f(3) = 11$

$g(-3) = (-3)-7$

$g(-3) = -10$

$f(-3) - g(-3)$

$= 11-(-10)$

$= 11+10$

$\boxed{f(-3)-g(-3) = 21}$ ✓

(4) Solve the problem.

4) Cindy bought a car for $18,614. The car depreciates at a rate of $150 per month. Formulate a model that can be used to determine the value, C(t), of the car t months after purchase. Find the value of the car after 34 months.

$C(t) = 18614 - 150t$ ✓

$C(t) = 18614 - 150(34)$

$C(t) = 18614 - 5100$

$C(t) = 13514$ ✓

value of car after 34 months is $13,514

(6) Find the indicated function value for the function.

5) Given $f(x) = \begin{cases} x-4, & \text{if } x < -1 \\ 2x, & \text{if } -1 \le x < 1 \\ 2x+3, & \text{if } x \ge 1 \end{cases}$

a. $f(4) = 2x+3$

$= 2(4)+3$

$= 8+3$

$f(4) = 11$ ✓

b. $f(-1) = 2x$

$= 2(-1)$

$f(-1) = -2$ ✓

c. $f(-3) = x-4$

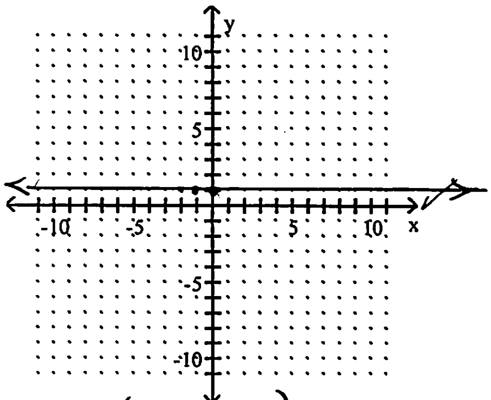
$= (-3)-4$

$= -7$

$f(-3) = -7$ ✓

(4) Graph, then state the domain and range.

6) $g(x) = 1$



Domain: $(-\infty,\infty)$

Range: $\{1\}$ ✓

(8) Find the domain of f. Write the domain in set builder notation or interval notation.

7) a. $f(x) = \dfrac{7x-5}{x^2+1}$

-2

$\{x \mid x \text{ is a real number and } \cancel{x \neq -1}\}$

b. $f(x) = \dfrac{7x-5}{x^2-1}$ $\quad \dfrac{7x-5}{(x+1)(x-1)}$

$x+1=0 \quad x-1=0$

$x=-1; x=1$

$\{x \mid x \text{ is a real numbers and } x \neq -1 \text{ and } x \neq 1\}$

c. $f(x) = 2x^2 - 7$

$\mathbb{R}; (-\infty, \infty)$

c. $f(x) = 3x + \dfrac{4}{x-5}$

$x-5=0$

$x=5$

$\{x \mid x \text{ is a real number and } x \neq 5\}$

(5) Solve.

8) The weight W of an object on the Moon varies directly as the weight E on earth. A person who weighs 187 lb on earth weighs 37.4 lb on the Moon. How much would a 188-lb person weigh on the Moon?

$W = KE$

$\dfrac{37.4}{187} = \dfrac{k187}{187}$

$K = 0.2$

$W = 188(0.2)$

$W = 37.6 \text{ lb}$

a person weighing 188 lb on Earth would weigh 37.6 lb on the moon

(4) Solve the formula for the specified letter.

9) $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{1}{c}$ for c

$(abc)\dfrac{1}{a} + (abc)\dfrac{1}{b} = \dfrac{1}{c}(abc)$

$bc + ac = ab$

$\dfrac{c(b+a)}{b+a} = \dfrac{ab}{b+a}$

$\boxed{c = \dfrac{ab}{b+a}}$

Solve.

10) (7 points)

Let $f(x) = x^2-3x-8$ and $g(x) = 2x-5$.

Find the following:

a. $g(-2) = 2(-2)-5$

$= -4-5$

$\boxed{g(-2) = -9}$

b. $f(-2) = (-2)^2 - 3(-2) - 8$

$= 4+6-8$

$\boxed{f(-2) = 2}$

c. $g(-2) - f(-2)$.

$= g(-2) - f(-2) = -9-2$

$\boxed{= -11}$

d. $(f+g)(x)$ $\quad f(x) + g(x)$

$x^2-3x-8 + 2x-5$

$\boxed{x^2 - x - 13} \leftarrow f(x)+g(x)$

e. Domain of f + g.

$\mathbb{R}; (-\infty, \infty)$

f. $(f/g)(x) = f(x)/g(x) = \dfrac{x^2-3x-8}{2x-5}$

h. Domain of (f/g)(x).

$2x-5=0$

$2x=5$

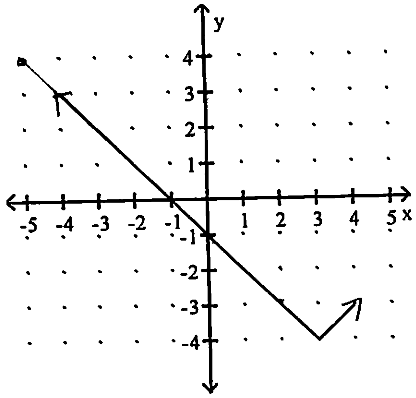
$\boxed{x = \dfrac{5}{2}}$

$\{x \mid x \text{ is a real number and } x \neq \frac{5}{2}\}$

-2

(4) For the graph of a function f. Find the following.

11)



a. Find f(2) =

$f(2) = -3$

b. If f(x)=4, find x.

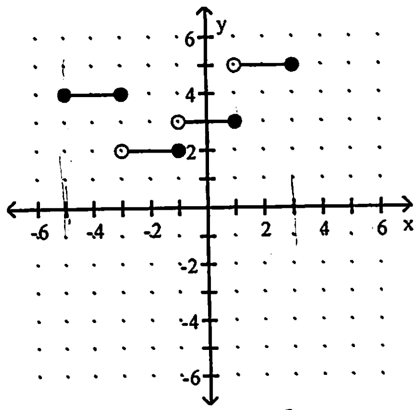
$x = -5$

c. Domain: $(-\infty, \infty)$

d. Range: $[-4, \infty)$

(4) For the graph of a function f, determine the domain and the range as indicated.

12) Find the range.



Domain: $[-5, 3]$

Range: $\{2, 3, 4, 5\}$

(3) Find the domain and the range for the following relation.

13) f = {(−1, 1), (3, −2), (4, 2), (7, 3), ~~(7, 3)~~}

a. Is this relation a function? Explain.

yes, none of the Range correspond to the same Domain.

b. Domain:

$\{-1, 3, 4, 7\}$

c. Range:

$\{1, -2, 2, 3\}$

(6) Solve the system.

14) $x - y + 5z = 27$ ①
$2x + z = 5$ ②
$x + 4y + z = -3$ ③

Step 1 eliminate "y"

① $(x - y + 5z = 27)4$
③ $x + 4y + z = -3$

①×4 + 3

$4\times$① $4x - 4y + 20z = 108$
+③ $x + 4y + z = -3$

④ $5x + 21z = 105$

Solution: $\{(0, -2, 5)\}$

Step 2

② $(2x + z = 5)\times -21$
④ $5x + 21z = 105$

$-21\times$② $-42x - 21z = -105$
+ $5x + 21z = 105$

$-37x = 0$
$x = 0$

Step 3 Substitute

② $2(0) + z = 5$
$z = 5$

① $0 - y + 5(5) = 27$
$-y + 25 = 27$
$-y = 2$
$y = -2$

(2, 3) **Find the value of the determinant.**

15) a. $\begin{vmatrix} -1 & 1 \\ 3 & 3 \end{vmatrix}$ $D = -3-3$

$D = 0$

(4) **Use Cramer's rule to solve the system of equations. If D = 0, use another method to determine the solution set.**

17) $x - 3y = 21$
$-3x - 4y = 15$

$\begin{vmatrix} 1 & -3 \\ -3 & -4 \end{vmatrix}$ $D = -4-9$
$D = -13$

b. $\begin{vmatrix} 3 & -5 & 1 \\ 2 & -3 & -3 \\ 4 & 5 & -2 \end{vmatrix} \begin{matrix} 3 & -5 \\ 2 & -3 \\ 4 & 5 \end{matrix}$

$D = (18+60+10)-(-12-45+20) \Rightarrow (88)-(-37)$

$88+37$

$D = 125$

$Dx \begin{vmatrix} 21 & -3 \\ 15 & -4 \end{vmatrix} = -84+45 = -39$

$Dy \begin{vmatrix} 1 & 21 \\ -3 & 15 \end{vmatrix} = 15+63 = 78$

$y = \frac{Dy}{D} = \frac{78}{-13}$ $\quad x = \frac{Dx}{D} = \frac{-39}{-13}$

$y = -6$ $\quad x = 3$

$\{(3, -6)\}$

(6) **Solve the system of equations.**

16) $x - y + 2z = -5$
$2x + z = 0$
$x + 4y + z = 20$

eliminate "y" ① + ③

$4\times$ ① $\{ x - y + 2z = -5$
② $\{ x + 4y + z = 20$

$\{ 4x - 4y + 8z = -20$
$\{ x + 4y + z = 20$

\+ ④ $5x + 9z = 0$

Step 2

② $\{(2x + z = 0) - 9$
$5x + 9z = 0$

$\{ -18x - \cancel{9z} = 0$
$\{ 5x + \cancel{9z} = 0$

$-13x = 0$
$\boxed{x = 0}$

$\{(0, -5, 0)\}$

② $\{ 2(0) + z = 0$
$\boxed{z = 0}$

① $\{(0) - y + 2(0) = -5$
$-y + 0 = -5$
$\boxed{y = -5}$

(5) **Define the variable, set up equations. DO NOT solve.**

18) A basketball fieldhouse seats 15,000. Courtside seats sell for \$9, endzone for \$7, and balcony for \$4. The total revenue from a sell-out is \$ 81,000. If half the courtside and balcony seats and all the endzone seats are sold, the total revenue is \$47,500. How many of each type are there?

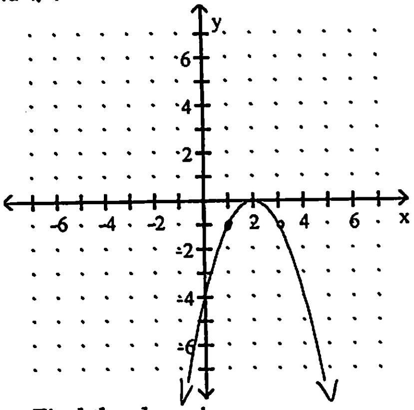
x = # of courtside seats (\$9)
y = # of end zone seats (\$7)
z = # of balcony seats (\$4)

$\{ x + y + z = 15000$
$9x + 7y + 4z = 81,000$
$9 \cdot \frac{1}{2} x + 4 \cdot \frac{1}{2} y + 4z = 47,500$

-2

(4) A function of x is depicted in the graph.

19)



a. Find the domain.

$(-\infty, \infty)$; $\mathbb{R}$

b. Find the range.

$(-\infty, 0]$

c. Find f(0)

$= -4$

d. Given f(x)=−1, find x.

$x = 1$ or $x = 3$

(6) Solve using matrices.

21) $x + y + z = -4$
$x - y + 2z = -1$
$3x + y + z = -12$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & -4 \\ 1 & -1 & 2 & -1 \\ 3 & 1 & 1 & -12 \end{array}\right] \cdot -1$$

$-1R_1 + R_2 \to R_2$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & -4 \\ 0 & -2 & 1 & 3 \\ 3 & 1 & 1 & -12 \end{array}\right] \cdot (-3)$$

$$\begin{array}{rrrr} -1 & -1 & -1 & 4 \\ + \; 1 & -1 & 2 & -1 \\ \hline 0 & -2 & 1 & 3 \end{array}$$

$-3R_1 + R_3 \to R_3$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & -4 \\ 0 & -2 & 1 & 3 \\ 0 & -2 & -2 & 0 \end{array}\right] \cdot (-1)$$

$$\begin{array}{rrrr} -3 & -3 & -3 & 12 \\ 3 & 1 & 1 & -12 \\ \hline 0 & -2 & -2 & 0 \end{array}$$

$$\begin{array}{rrrr} 0 & 2 & -1 & -3 \\ 0 & -2 & -2 & 0 \\ \hline 0 & 0 & -3 & -3 \end{array}$$

$-1R_2 + R_3 \to R_3$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & -4 \\ 0 & -2 & 1 & 3 \\ 0 & 0 & -3 & -3 \end{array}\right]$$

$x + y + z = -4$
$-2y + z = 3$ $\quad -2y + 1 = 3$
$-3z = -3$ $\quad -2y = 2$
$y = -1$

$z = 1$

$x + (-1) + (1) = -4$
$x - 1 + 1 = -4$
$x = -4$

$\{(-4, -1, 1)\}$

(4) Find the function value.

20) Given $f(x) = x^2 + 4$.

a. Find f(−2) $= (-2)^2 + 4$
$= 4 + 4$
$f(-2) = 8$

b. Find f(a + 3) $= (a+3)^2 + 4$
$= (a+3)(a+3) + 4$
$= (a^2 + 3a + 3a + 9) + 4$
$= a^2 + 6a + 9 + 4$
$f(a+3) = a^2 + 6a + 13$