

Math 099 - Summer 2010 - Test 3

Instructor: Dr. Francesco Strazzullo

Name: KEY

Instructions. Only calculators are allowed on this examination. Point values of each problem are indicated. Always use the appropriate wording and units of measure in your answers (when applicable). **SHOW YOUR WORK NEATLY, PLEASE** (no work, no credit).

1. (15pts) Gas price is \$2.50 per gallon from Monday to Thursday. What is the price of gas on Saturday if during the weekend there is a 12% rise?

$Q = \text{OLD PRICE}$, $N = \text{NEW PRICE (WEEKENDS)}$, $R = \text{"INCREASE RATE" = "RISE"}$

$$N = Q + Q \cdot R = (1 + R)Q$$

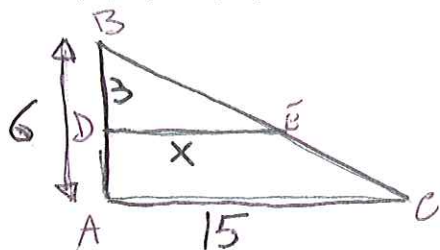
HERE $Q = 2.5$, $R = 12\% = .12$, SO THAT $N = 2.5(1 + .12) = 2.8$

ON SATURDAY THE PRICE IS \$2.80 PER GALLON.

2. (10pts) Solve the proportion $\frac{4}{x} = \frac{3}{7}$.

CROSS MULTIPLY: $\frac{4 \cdot 7}{3} = \frac{3 \cdot x}{3} \rightarrow x = \frac{4 \cdot 7}{3} = \frac{28}{3} = 9.\bar{3}$

3. (10pts) Use proportions to find x .

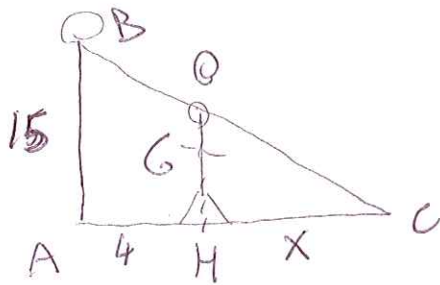


ABC IS SIMILAR TO DBE THEN:

$$\frac{DE}{AC} = \frac{BD}{BA} \quad \text{THAT IS}$$

$$\frac{x}{15} = \frac{3}{6} \rightarrow \frac{x}{15} = \frac{1}{2} \rightarrow x = \frac{15}{2} = 7.5$$

4. (15pts) Late one evening, a 6-foot person is standing 4 feet from a streetlight. The streetlight is 15 feet tall. How long is the person's shadow?



ABC SIMILAR TO HOC, THUS

$$\frac{HC}{OH} = \frac{AC}{BA}, \text{ WITH } AC = 4 + X.$$

THEN: $\frac{X}{6} = \frac{4+X}{15}$

$$\frac{5}{30} \frac{X}{1} = \frac{2}{30} \frac{4+X}{15} \rightarrow$$

L.C.D = 30

$$\rightarrow 5X = 2(4+X) \rightarrow 5X = 8 + 2X \rightarrow 5X - 2X = 8$$

$$\rightarrow 3X = 8 \rightarrow X = \frac{8}{3} = 2.\overline{6} \text{ FEET}$$

5. (15pts) Paolo earns \$569 from working 54 total hours at two jobs. He earns \$11.25 per hour at the first job and \$9.50 per hour at the second job. How many hours does he work at each job?

	QTY HOURS	R. VALUE	QTY SALARY
JOB 1	X	11.25	11.25X
JOB 2	Y	9.5	9.5X
TOTALS	54		569

SUM $\begin{cases} X + Y = 54 \\ 11.25X + 9.5Y = 569 \end{cases}$

BY SUBSTITUTION $\begin{cases} Y = 54 - X \end{cases}$

$$11.25X + 9.5(54 - X) = 569 \rightarrow$$

$$\rightarrow 11.25X + 513 - 9.5X = 569 \rightarrow 1.75X = 56 \rightarrow$$

$$\rightarrow X = 32 \quad \text{PLUS} \quad Y = 54 - 32 = 22$$

PAOLO WORKS 32 HOURS AT JOB 1 AND 22 HOURS AT JOB 2.

6. (15pts) Solve the system of linear equations

$$\begin{cases} 6x + 2y = 4 \\ 3y - 2 = x \end{cases}$$

$$\begin{aligned} \frac{1}{2} \text{EQ1: } 3x + y &= 2 \\ \text{REWRITES: } -x + 3y &= 2 \\ \text{EQ2: } -x + 3y &= 2 \end{aligned}$$

ELIMINATION:

$$-3\text{EQ2: } -9x - 3y = -6$$

$$\begin{array}{r} -10x = -4 \rightarrow x = \frac{4}{10} = \frac{2}{5} \end{array}$$

$$\rightarrow y = \frac{4}{5}$$

$$\text{SOLUTION: } \left\{ \left(\frac{2}{5}, \frac{4}{5} \right) \right\}$$

$$\text{OR } \{ (-4, -8) \}$$

7. (15pts) Lucia is allowed 140 calories for a snack. Apricots contain 20 calories each, and tangerines contain 35 calories (each). Lucia wants no more than 2 tangerines each day. Let x = the number of apricots, and y = the number of tangerines. Write a system of inequalities to describe the possible numbers of each item Lucia can eat. Graph and show the solution set (according to the context). Label the corner point and provide at least one possibility for the snack.

	Q	R	Q-R
TANGERINES	Y	35	35Y
APRICOTS	X	20	20X
TOTALS			≤ 140

"NO MORE THAN 2 TANGERINES": $y \leq 2$

$$20x + 35y \leq 140 \rightarrow$$

$$\frac{35y}{35} \leq \frac{-20x + 140}{35} \rightarrow y \leq -\frac{4}{7}x + 4$$

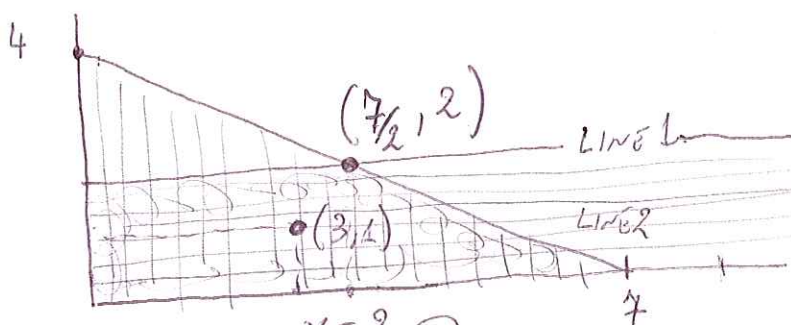
$$\text{LINE 1: } y \leq 2$$

$$\text{LINE 2: } y \leq -\frac{4}{7}x + 4$$

BOTH x AND y ARE NON-NEGATIVE:

$$x \geq 0, y \geq 0$$

ONE POSSIBLE CHOICE: 3 APRICOTS AND 1 TANGERINE, $(3, 1)$



$$\begin{aligned} \text{CORNER POINT: } & \begin{cases} y = 2 \\ 20x + 35y = 140 \end{cases} \rightarrow 20x + 70 = 140 \\ & \rightarrow 20x = 70 \rightarrow x = \frac{7}{2} \end{aligned}$$

8. (15pts) From our last test we have the following percents: 80, 72, 98, 65, 88, 90, 78, 77, 84. What are the median and the average percents?

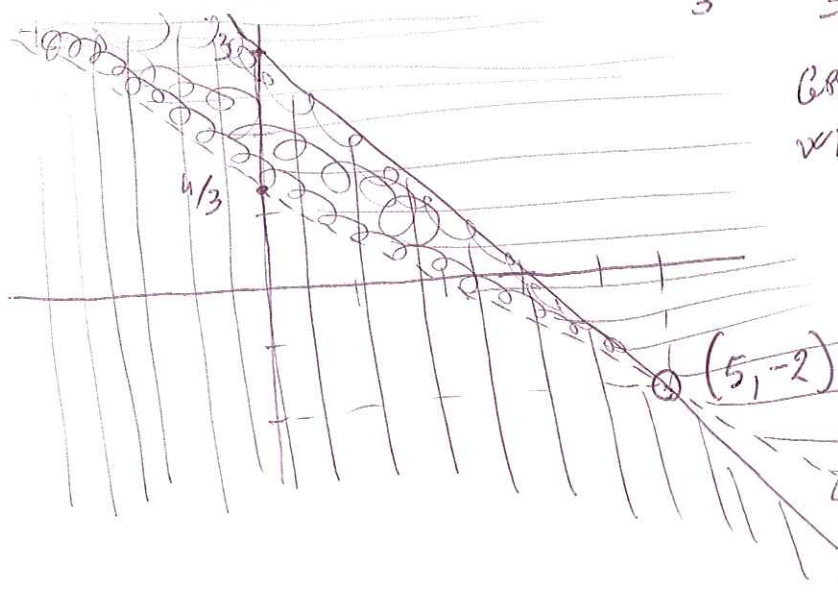
$$\text{MEDIAN} = 80\%$$

$$\text{AVERAGE} = 81.3\%$$

9. (15pts) Label the corner point, and graph and show the solution set of the system of linear inequalities

$$\text{LINE 1} \begin{cases} x + y \leq 3 \end{cases} \rightarrow Y \leq -X + 3$$

$$\text{LINE 2} \begin{cases} 2x + 3y > 4 \end{cases} \rightarrow 3Y > -2X + 4 \rightarrow Y > -\frac{2}{3}X + \frac{4}{3}$$



GRAPH IN THE STANDARD WINDOW:

$$Y_1 = -X + 3$$

$$Y_2 = -\frac{2}{3}X + \frac{4}{3}$$