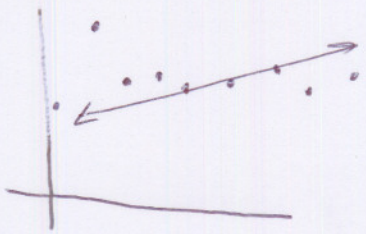
MAC1105 Test 3 Name Key
Prof Howard (3-16)

Show all work for credit. Turn in all scratch work in a neat and orderly fashion.

1. The table gives the percent p of African voters who have supported Democratic candidates for president for the years 1960-1996.

Year	Democrat (%)
1960	68
1964	94
1968	85
1972	87
1976	85
1980	86
1984	89
1992	82
1996	84



a. Is the percent p a function of the year? Explain.

5pts Yes, for every input, there is only one output. (VLT passes)

b. Let $p = f(x)$ denote that p is a function of the year. Find $f(1992)$ and explain what it means.

$f(1992) = 82$

5pts In 1992, 82% of African American voters ~~who have~~ supported Democratic candidates for president

c. What is x if $f(x) = 94$? What does this mean?

$f(1964) = 94$

5pts In 1964, 94% of African American voters supported Democratic candidates for president.

d. What is the domain of the function described in the table?

4pts $[1960, 1996]$ OR $1960 \le x \le 1996$ But every 4th year! or $x \in \{1960, 1964, 1968, \ldots 1996\}$

e. ~~Do~~ a scatterplot in the window [1955, 2000] by [60, 100] . Which shape best fits the data (linear, quadratic, or cubic)?

4pts

f. Calculate the linear regression equation.

4pts $y = 0.10625x - 125.6$

g. What is the slope and what does the slope mean in the context of the problem?

5pts $m = \frac{0.10625\%}{1}$ An increase of 0.10625% of African americans supported Democratic presidents each year.

h. Does a linear function model the data in the table exactly? Explain.

4pts No, not exactly a line.

i. Use your equation in part f to predict the percent of African American voters who supported Democratic candidates for president in the year 1982.

4pts $y = 0.10625(1982) - 125.6$

$y = 84.9875\%$

prop value

2. A business property can be depreciated for tax purposes by using the formula $y + 3000x = 300{,}000$, where y is the value of the property x years after it was purchased.

a. Find the ~~y-intercept~~ years since purchase of the graph of this function. Interpret this value.

4pts $y + 3000(0) = 300{,}000$

$y = 300{,}000$

$(0, 300000) \Rightarrow$ Intial purchase value is \$300,000.

b. Find the x-intercept of the graph of this function. Interpret this value.

4pts $0 + 3000x = 300000 \Rightarrow x = 100$ After 100 years, value of property is zero.

3. The mean time in prison y for a crime can be found as a function of the mean sentence length x, using $y = 0.554x - 2.886$, where x and y are in months. If a convicted criminal served 17 months, how long was the criminal's sentence length ordered by the judge? Solve by a method of your choice.

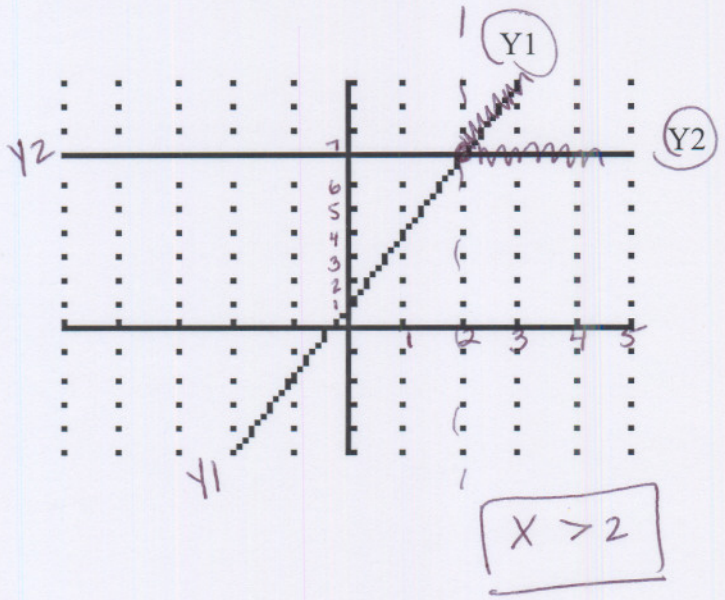
8pts mean time in prison (months) / mean sentence length (months)

$17 = 0.554x - 2.886$

$19.886 = 0.554x$

35.9 months x

4. Use the graph to solve an equation where Y1 > Y2. Each tick mark represents one unit.



6 pts

$X > 2$

5. Match the slopes with the appropriate lines shown below. Place your answer in the boxes provided.

$m = \frac{1}{5}$

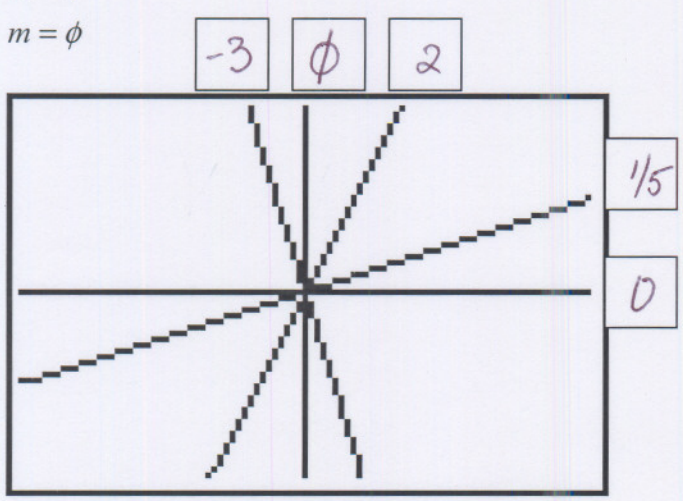
$m = -3$

$m = 2$

$m = 0$

$m = \phi$

4 each



6. $\begin{cases} 3x - 4y = 21 \\ 2x + 5y = -9 \end{cases}$

a. Solve by the substitution method.

$\begin{cases} 3x-4y=21 \\ 2x+5y=-9 \end{cases} \Rightarrow x = \frac{21+4y}{3}$

$2\left(\frac{21+4y}{3}\right) + 5y = -9$

6 pts

$\frac{42}{3} + \frac{8}{3}y + 5y = -9$

$\frac{42}{3} + \frac{8}{3}y + \frac{15}{3}y = -9$

$\frac{42}{3} + \frac{23}{3}y = -9$

$-14 \quad -14$

$\frac{23}{3}y = -23$

$y = -3$

$x = \frac{21+4(-3)}{3}$

$x = \frac{21-12}{3}$

$x = \frac{9}{3}$

$x = 3$

b. Solve by the elimination method.

6 pts

$\begin{cases} (3x-4y=21)(2) \\ (2x+5y=-9)(-3) \end{cases}$

$6x - 8y = 42$

$-6x - 15y = 27$

$-23y = 69$

$y = -3$

$3x - 4(-3) = 21$

$3x + 12 = 21$

$3x = 9$

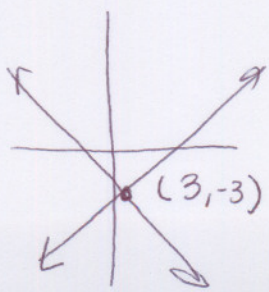
$x = 3$

c. Solve by graphing.

$y_1 = (-3x + 21)/-4$

$y_2 = (-2x - 9)/5$

6 pts.



$x = 3$

$y = -3$