

Economics 102
Summer 2017
Quiz #0 With Answers

1. (1 point) You are given the following two points $(X, Y) = (10, 20)$ and $(-5, 10)$. Write a line in y-intercept form. Show your work.

Answer:

Slope of line = (change in Y)/(change in X) = $(20 - 10)/(10 - (-5)) = 10/15 = 2/3$

General form of equation in y-intercept form: $Y = mX + b$

$Y = (2/3)X + b$

Use one of the known points to find the value of "b":

$20 = (2/3)(10) + b$

$60/3 - 20/3 = b$

$b = 40/3 = 13.3$

$Y = (2/3)X + (40/3)$ or $Y = (2/3)X + 13.3$

2. You are given the following two equations that describe two linear lines:

Equation 1: $Y = 100 - 2X$

Equation 2: $Y = 20 + 6X$

a. (1 point) At what (X, Y) do these two lines intersect with one another. Show your work.

Answer:

To find where these two lines intersect we need to set the two equations equal to one another:

$100 - 2X = 20 + 6X$

$80 = 8X$

$X = 10$

When $X = 10$, then $Y = 100 - 2X = 100 - 2(10) = 80$ or $Y = 20 + 6X = 20 + 6(10) = 80$

The two lines intersect at $(X, Y) = (10, 80)$

b. (2 points) You are told that equation 2 shifts to the right in a parallel manner such that for every Y value the new X value is now 20 units larger than the initial X value. Given this information, what do you conclude about the new point of intersection between line 1 and the new line? That is, will the new X value be greater or smaller than the initial X value? Will the new Y value be greater or smaller than the initial Y value?

Answer:

The new X value will be greater than the initial X value and the new Y value will be greater than the initial Y value.

c. (2 points) Go back to the initial situation. You are now told that equation 1 has changed such that for every X value the Y value is now two units smaller. The new equation 1 is parallel to the old equation 1. Given this information and holding everything else constant, find the new (X, Y) .

Y") where the new equation 1 intersects with the initial equation 2. Show your work. Carry your answers out to two places past the decimal.

Answer:

The equation for the new line 1 is: $Y = 98 - 2X$

Use this equation and the equation for line 2 to find the new point of intersection between these two lines:

$$98 - 2X'' = 20 + 6X''$$

$$78 = 8X''$$

$$X'' = 78/8 = 9.75$$

$$Y'' = 98 - 2X'' = 98 - 2(78/8) = 98 - (78/4) = 98 - 19.5 = 78.5 \text{ or}$$

$$Y'' = 20 + 6(78/8) = 20 + 3(78/4) = 20 + 3(19.5) = 20 + 58.5 = 78.5$$

$$(X'', Y'') = (9.75, 78.5)$$

3. (2 points) The price of money is the interest rate. Joe finds that he is willing to borrow \$10,000 when the interest rate is 5% and \$20,000 when the interest rate is 1%. Assume that for Joe the relationship between the interest rate (let's call this "r") and the amount of loans (let's call this "L") is linear. Write an equation for this relationship in "L-intercept form". Show your work. In your answer assume that if the interest rate is 5%, then in the equation this will be represented as $r = 5$ and not $r = .05$. Write your equation using improper fractions rather than decimals.

Answer:

Start by noting that we have two known points: $(L, r) = (10,000; 5)$ and $(20,000; 1)$. We can use these two points to find the slope of the equation: $\text{slope} = (\text{change in } y)/(\text{change in } x) = (\text{change in } L)/(\text{change in } r)$ since we are writing this equation as if L was measured on the vertical axis.

$$\text{Slope} = (20,000 - 10,000)/(1 - 5) = -2500.$$

Then, use the general formula $Y = mX + b$ where m is the slope, b is the y-intercept, Y is the variable measured on the vertical axis and X is the variable measured on the horizontal axis.

$$Y = mX + b$$

$$L = (-2500)r + b$$

Substitute one of our known points into this equation to find the value of b:

$$20,000 = (-2500)(1) + b$$

$$22,500 = b$$

$$b = 22,500$$

$$\text{Equation for this relationship in L-intercept form: } L = (-2500)r + 22,500$$

4. (2 points) Sue knows that her economics grade is based upon her two midterms, her final, four quizzes, and five homeworks. She anticipates that she will get 7 out of ten possible points on her quizzes, and 10 out of ten possible points on her homeworks. She took the first midterm and made a 42 out of a possible 60 points and on the second midterm she made a 72 out of 80 points. Suppose her grade is calculated on a 100 point scale and each midterm is worth 25% of her grade, the final is worth 30% of her grade, the quizzes are worth 10% of her grade, and the homeworks are worth 10% of her grade. If she needs a weighted final score of 80 in order to get an AB in the class, what must her score on the 100 point final exam be equal to? Show your work!

Answer:

First we need to convert the midterm one and midterm two scores to 100 point scales:

$$(\text{Midterm One Score})/60 = X/100$$

$$42/60 = X/100$$

X = score on first midterm converted to a 100 point scale = 70

$$(\text{Midterm Two Score})/80 = Y/100$$

$$72/80 = Y/100$$

Y = score on second midterm converted to a 100 point scale = 90

Weighted Final Grade = (Midterm One Score on a 100 point scale)(.25) + (Midterm Two Score on a 100 point scale)(.25) + (Total Points on Quizzes measured on a 10 point scale) + (Total Points on Homeworks measured on a 10 point scale) + (Final Exam Score on a 100 point scale)(.3)

$$\text{Weighted Final Grade} = (70)(.25) + (90)(.25) + 7 + 10 + (\text{Final})(.3)$$

To get an AB, Sue needs to have a Weighted Final Grade of 80 out of a possible 100 points: thus,

$$80 = 17.5 + 22.5 + 17 + \text{Final}(.3)$$

$$80 = 57 + \text{Final}(.3)$$

$$23 = \text{Final}(.3)$$

$23/.3 = \text{Final Exam Score on a 100 point scale needed to have a final weighted grade of 80}$

Final Exam Score on a 100 point scale needed to have a final weighted grade of 80 = 76.67