Solutions for quizzes

**Pre-test**

1. This graph shows the relationship between the numbers of policemen (x) and crimes committed per hour in Rio de Janeiro (y). What is the equation of this graph?



**a. y = 3 - 0.5x**

b. y = 3 + 0.5x

c. y = 2 - 0.5x

d. y = 4 + 0.6x

e. Not sure

Answer: a. y = 3 – 0.5x

Solution 1: set y=ax+b, put (0,3) and (6,0) in it.

Solution 2: the slope is -3/6, and the constant is just the intercept on vertical line.

2. A rating system being proposed to measure the financial health of a nonprofit has total 20 questions worth 100 points.  The questionnaire consists of two parts: Yes/No questions worth 3 points each, and longer questions worth 11 points each.  How many longer questions are on the rating system?

a. 8

**b. 5**

c. 15

d. 4

e. Not sure

Answer: b.5

Solution: set two equations:

 s+l=20

 3s+11l=100

 s=15, l=5

Q3 3. The benefit of a military training program is:  Y= -0.5X2+7X+4, where X is the duration of the program in months. What is the optimum length of the program?

**a. x = 7**

b. x = 14

c. x = 4

d. x = 57/2

e. Not sure

Answer: a. x=7

Solution: take first derivative: (-0.5\*2) x +7=0, x=7

Q4 4. Look at cars.csv. What is the mean travel time? (Round to one decimal place. You can use whatever software you want to figure this out: excel or STATA).

a. 15.3

b. 22.2

**c. 26.7**

d. 39.4

e. Not sure

Answer: c. 26.7

Solution: use average formula in excel.

**Quiz 1**

1. Service Employees International Union is discussing the conditions for workers in MNJ Inc. MNJ workers make an average of $0.25 per customer in tips. The workers also make a base salary of $20 per day regardless of how many customers they help. Write the equation that describes the relationship of MNJ workers’ daily pay (Y) and the number of customers they serve (X) in one day.

**a. Y=20+0.25x**

b. Y=5x

c. Y=20+4x

d. Y=0.25+20x

e. Not sure

Answer: a. Y=20+0.25x

Solution: just put the numbers in the equation.

2. Y= 4x-6 What is the intercept and slope of this function?

a. Intercept: 4, Slope: -6

b. Intercept: 4, Slope: -6

**c. Intercept: -6, Slope: 4**

d. Intercept: -6, Slope: 4

e. Intercept: 6, Slope: 4

f. Intercept: 4, Slope: 6

g. Not sure

Answer: c. Intercept: -6, Slope: 4

Solution: intercept is where the line cut the vertical axis, then it is -6, the slope is the 4.

3. What is the equation of this graph?  (Vertical line represents Y and horizontal line represents X)



a. Y=2+4x

b. Y=4-2x

c. Y=-2+2x

**d. Y=4+2x**

e. Not sure

Answer: d. Y=4+2x

Solution: the intercept: 4,

the slope (look at -2,0 going to 0,4): increase in y / increase in x = +4/+2=2,

4. The demand function for gasoline in the United States in 2015 can be described by q= 6-p/2.  If price is $4, how many units will be demanded?  If the supply function for gasoline is described by q=1+2p, what is the market price in the US in 2015?

a. When p=$4, q=6. Market price is $2

b. When p=$4, q=6. Market price is $3

c. When p=$4, q=3. Market price is $4

d. When p=$4, q=1. Market price is $4

**e. When p=$4, q=4. Market price is $2**

f. When p=$4, q=4. Market price is $4

g. Not sure

Answer: e. When p=$4, q=4. Market price is $2

Solution: For the first part, put p=4 into q= 6-p/2. q=4. For the second part of this question, set two equations together: 6-p/2=1+2p, then you get the p=2.

5. Recall the demand function for gasoline in the US in 2015 can be described by q= 6-p/2. Which equation allows me find the price of gasoline given the demand?

a. p=6-q/2

**b. p=12-2q**

c. p=2q-12

d. p=q/2-6

e. Not sure

Answer: b. p=12-2q

Solution: q= 6-p/2

p/2=6-q (move p/2 to the other side of the = sign, then move q to the other side)

multiply both side with 2

p = 12-2q

6. You regress the acreage of farmland in Afghanistan against the number of poppy plants

--------------------------------------------------------------------------

poppy  |      Coef.   Std. Err.      t      P>|t|     [95% Conf. Interval]

-------------+----------------------------------------------------------------

acreage |   .786       1.803     0.44   0.664    -2.81   4.38

   \_cons |  10.713      .220    66.83  0.000   10.28  11.14

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Which of the following is true according to this regression?

a. We can be 95% sure that there are more poppy plants in land with larger acreage.

**b. The relationship between acreage and the number of poppy plants is not significant.**

c. The likelihood of getting the coefficient 10.71 if there's no relationship between acreage and the number of poppy plants is very small.

d. Not sure

Answer: b. The relationship between acreage and the number of poppy plants is not significant.

Solution: For option a., there are both positive and negative numbers in the 95% confidential interval, therefore, we cannot say we are 95% sure. For option b., the p-value of acreage is 0.664, which is much greater than 0.05, even 0.1. Therefore, it is statistically insignificant. For option c., the 10.71 is when acreage variable equals zero, but it doesn't mean there’s no relationship between them.

**Quiz 2**

1. What is log28? What is e?

a. log28= 4, e=3.14

b. log28= 3, e=3.14

c. log28 = 4, e=2.72

**d. log28= 3, e=2.72**

e. Not sure

Answer: d. log28= 3, e=2.72

Solution: 2x=8, x=3. e= 2.71828.

2. The equation y= -0.125x2+0.25x+4 shows the relationship between the numbers of romantic partners in college (x) and grades (y). Identify the constant, variable and exponent of -0.125x2.

a. Constant: x, Variable: -2, Exponent: 3

b. Constant: 3, Variable: x, Exponent: 2

**c. Constant -0.125, Variable: x, Exponent: 2**

d. Constant: 0.125, Variable: x, Exponent: 2

e. Not sure

Answer: c. Constant -0.125, Variable: x, Exponent: 2

Solution: remember what a constant is (the thing multiplied to the thing you’re interested in), exponent is the power.

3. Take the first derivatives of the equation -0.125x2+0.25x+4.

**a. -0.25x+0.25**

b. 0.25x-0.5

c. -0.25x+0.25+4

d. 0.25x+0.25+4

e. Not sure

Answer: a. -0.25x+0.25

Solution: (-0.125\*2)x+0.25

4. Given question 2 and 3 above, what is the optimum number of romantic partner(s)?

**a. 1**

b. 0

c. 2

d. 5

e. Not sure

Answer: a.1

Solution: use the answer from Q3 and set it equal it to 0: -0.25x+0.25=0, x=1.

5. This function describing the relationship between the numbers of voters (y), campaign funds (x) and amount of newspaper coverage (z) is y =20000-x2+50x+50z. Which function below describes how the number of voters grows as campaign funds increase?

a. dy/dx= -2x+50+50z

b. dy/dx= -x2+50x

**c. dy/dx= -2x+50**

d. dy/dx= 20000-x2+50x

e. dy/dx= x- 50-z

f. Not sure

Answer: c. dy/dx= -2x+50

Solution: Ignore anything without x, then take the first derivative: -2\*x^(2-1)+50\*1\*x^(1-1) = -2x+50.

6. Which of the statements below about these graphs is correct?



**a. Yellow is a quadratic function, red is a square root, blue is a linear function**

b. Yellow is cube function, red is a log function, blue is a linear function

c. Green is a quadratic function, red is a linear function, yellow is a cube function

d. None of the above

e. Not sure

Answer: a. Yellow is a quadratic function, red is a square root, blue is a linear function.

Solution: green is cube function (y=x^3)

**Quiz 3**

york.csv contains data on Self-Reports of Height and Weight Among Men and Women Active in Exercise from Departments of Physical Education and Psychology, York University. Please answer q.1-4 below. If you finish early and would like a challenge question, use "twoway" to compare the relationship between actual height and actual weight for men and women.

Answer to challenge:

Solution:

command: twoway (scatter measht measwt if female) || (scatter measht measwt if !female)

1. What is the mean measured weight? (use STATA)

**a. 65.8**

b. 56.4

c. 70.2

d. 55

e. 65.4

f. Not sure

Answer: a. 65.8

Solution: mean measwt

2. What is the mean measured weight for men? (hint: you need to use "if" in your command. Round to one decimal place.)

**a. 75.9**

b. 57.9

c. 65.8

d. 77.5

e. 54.4

f. Not sure

Answer: a. 75.9

Solution: mean measwt if female==0

3. Which of the equation below represents the relationship between measured weights (y) and measured heights (x)? (hint: you need to use "reg" in your command. Round to two decimal places.)

a. y = -0.24x+25.27

b. y = 0.23x+26.33

c. y = 0.23x+25.27

**d. y = 0.24x+25.27**

e. Not sure

Answer: d. y = 0.24x+25.27

Solution: reg measwt measht

4. Among the commands below, which one will generate a new variable that represents the difference between measured weights and reported weights?

a. measwt-reptwt

b. gen measwt-reptwt = diff

**c. gen diff = measwt-reptwt**

d. gen measwt-reptwt

e. Not sure

Answer: c. gen diff = measwt-reptwt

Solution: to generate a variable you need to write “gen”, then the name of the new variable (“diff”, in this case), then an “=” sign, then how you want to generate that variable (in this case “measwt-reptwt”)

**Group Quiz**

1. A 2014 UNRWA report noted that the relationship between refugee camp overcrowding (x) and prevalence of scabies (y) can be described by x=0.2y+4. If y=3x-10 describes the relationship between diarrhea incidence (y) and overcrowding (x), how dense are the camps where scabies is more prevalent than diarrhea?

 a. When there’s more than 10 families per block

 **b. When there’s more than 5 families per block**

 c. When there’s less than 20 families per block

 d. When there’s less than 10 families per block

 e. Not sure

Answer: b. When there’s more than 5 families per block

Solution: First you want to make x=0.2y+4 into something like y=a+bx.

So: move -4 to the other side: 0.2y = x-4

Divide both sides by 0.2:

 y= 5x-20

Now you have two equations, y= 5x-20 and Y=3x-10, and you set them equal to each other:

 5x-20=3x-10

 0=2x-10

 2X=10 x=5

2. Suppose the relationship between illnesses (y), density of families per block (x), and water availability (z) is y = 1-2x+0.25x^2 -0.5z. What is the optimal number of families per block to minimize the spread of illnesses?

 **a. 4 families per block**

 b. 5 families per block

 c. 0.5 families per block

 d. 8 families per block

 e. Not sure

Answer: **a. 4 families per block**

Solutions: “Minimize” so you’ll have to find where the slope is zero.

So first you find the derivative: ignore everything without an x and take the derivative, you will get -2+0.25\*2x=-2 + 0.5x

 Now you set the derivative to 0 and solve for x:

-2 + 0.5x=0

X=4

3. Open school.csv. Draw a scatterplot with test score (testscr) on the y axis and average income (avginc) on the x axis. Does this look like a linear relationship? Why, or why not?

 a. It is linear, because the relationship between x and y is constant

 b. It is not linear, because the relationship between x and y is constant

 c. It is linear, because the relationship between x and y is not constant

 **d. It is not linear, because the relationship between x and y is not constant**

 e. Not sure

Answer: d. It is not linear, because y increase a lot with x in the beginning but just a little at the end.

Solution: scatter testscr avginc

4. Generate a new variable that is the log of average income and call it logavginc. Regress testscr against logavginc. Which of the equations below describes the relationship between test scores (y) and income (x)?

 a. y = 625 + 1.88 x

 b. y = 625 + 1.88 log(x)

 c. y= 558 + 36.4 x

 **d. y= 558 + 36.4 log (x)**

e. Not sure

Answer: d. y= 558 + 36.4 log (x)

Solution: gen logavginc = log(avginc)

reg testscr logavginc

you will get: testscr = 557.8 + 36.4 log(avginc)

why not testscr = 557.8 + 36.4 avginc ? because you took the log of the avginc first before running the regression.

5. Use no.4 to answer this question What is the effect of a $1k income increase on test scores in a district with an average income of 10k? What about a district with an average income of 20k?

**a. $1k increase in income will increase test scores by 3.5 points in district**

 **with $10k average income and by 1.8 points in districts with $20k average**

 **income.**

1. $1k increase in income will increase test scores by 87 points in district with $10k average income and by 110 points in districts with $20k average income.
2. $1k increase in income will increase test scores by 0.18 points in district with $10k average income and by 0.09 points in districts with $20k average income.
3. $1k increase in income will increase test scores by 1.9 points in both districts
4. $1k increase in income will increase test scores by 36.4 points in both districts
5. Not sure

Answer: a. $1k increase in income will increase test scores by 3.5 points in

district with $10k average income and by 1.8 points in districts with $20k average income.

Solution:

Two ways:

Way 1:

. display 36.41968\* (log (11)-log(10))

3.4711662

. display 36.41968\* (log (21)-log(20))

1.7769222

Way 2:

Remember testscr = 557.8 + 36.4 log(avginc)

Use this to calculate test scores at 11 and 10 and then substract. You’ll get 3.47

Then calculate test scores at 21 and 20, and then substract. You’ll get 1.777