Quiz 6 & 7 (Take Home)

Name: _____

Due Date and Time: By class time on May 5, 2016

(60 pts total)

Code of Academic Honesty

The work on this exam represents my own. I am allowed to use class notes and lectures. I am not allowed to get help from any other human being (classmates, other teachers, tutors, spouses, children, other family members,….). I am allowed to use http://www.wolframalpha.com/ when necessary.

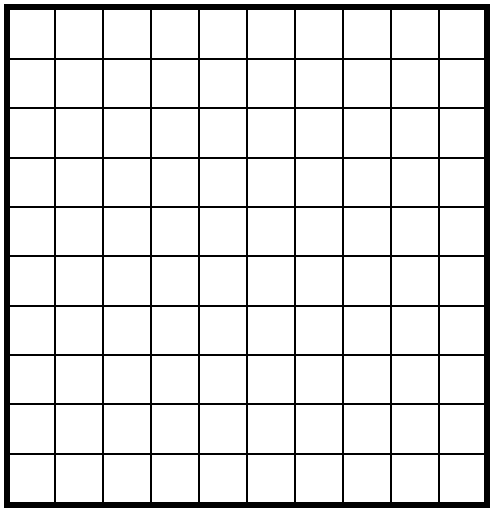
Signature_____ Date: _____

Guidelines and criteria for the Quiz

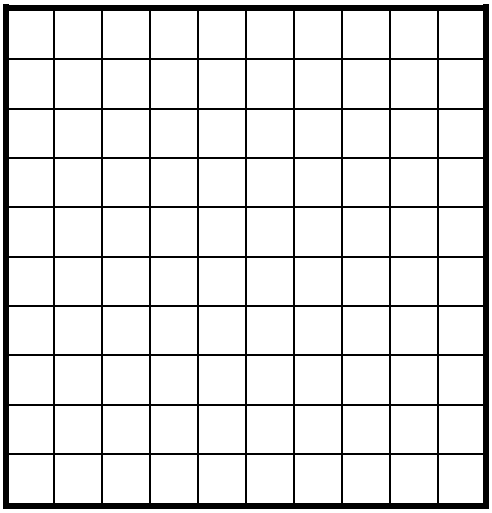
1. **If you break the Code of Academic Honesty, proceedings of academic misconduct will be brought against you and you risk getting a zero on this test.**
2. **If you do not follow the guidelines established in class and lectures on how the solutions are written and presented, you may risk getting a zero on the exam.**
3. **All graphs should be presented using a graph paper or the grid that is provided to you on the exam, or when using *http://www.wolframalpha.com/* website (in this case either print your graph, or cut paste your graph electronically).**
4. **On all graphs the axes must be clearly labeled (including use of proper units when appropriate).**
5. **On all graphs please show the appropriate scale.**
6. **Use a ruler to graph all your lines. Graphs where a ruler is not used will not get any credit.**
7. **The work should be written neatly. If the solutions are illegible, you risk getting a zero on these solutions.**
8. **You must be able to defend your work orally if needed.**
9. **No late quizzes are accepted.**
10. **Please staple all pages before turning the exam in.**

1. Plot the lines below by showing the two points for each line as indicated above. (4 pts)

a. $y = -\frac{3}{4}x + 3$ Point one is (,), Point two is (,).



b. $x = -\frac{4}{3}y + 4$ Point one is (,), Point two is (,).



2. When we write the equation of a line in the form $= \frac{a}{b}x + c$, we can use the facts that c =y-intercept and slope= $\frac{a}{b}$ as follows. To graph the line, plot the point $(0, c)$ and then plug in $x = b$ units and the y-value moves up/down(up if slope is positive, and down if slope is negative a units to obtain a second point $(b, c + a)$ on the line (Hint: Use observations from problem number 1. above.)

   If we write an equation of a line in the form $x = \frac{b}{a}y + d$,

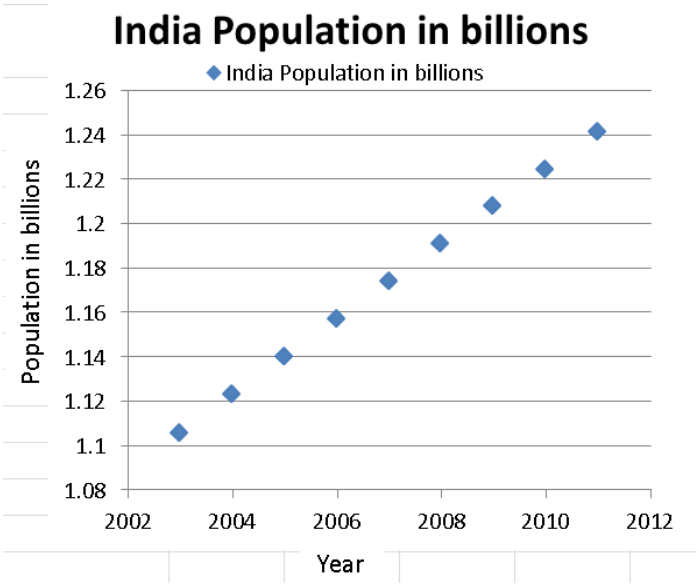
   a. What does d represent? (2 pts)

   b. What point will you plot on the line using d? (2 pts)

   c. How will you use $\frac{b}{a}$ to move to a second point on the line from the point in part b.? (2 pts)

3. Consider the graph below and the answer the following questions.
   a. Assuming a linear trend in the data, draw a line that could represent the data. (You must use a ruler to draw your line. A line drawn not using a proper tool will not be acceptable.) (2 pts)
   b. Find the slope of your line. (1 pt)
   c. What is the meaning of the slope of your line. (1 pt)
   d. What is y-intercept of your line? (1 pt)
   e. What is the meaning of the y-intercept of your line. (1 pt)
   f. Find the equation of the line you drew. (Such a line is called a mathematical model of the data you have.) (2 pts)
   g. What do the variables in your equation represent? (2 pts)
   h. Using the equation of the line you found in part f, what was the population of India in the year 2010? How does this number compare to the actual data point in the table. (2 pts)
   i. Use your mathematical model to predict the population of India in the year 2013? (2 pts)
   j. Using any means to find the current population of India. How does this answer compare to your prediction? Explain the difference if there is any. (2 pts)

YEAR	India Population in billions
2003	1.105885689
2004	1.122991192
2005	1.140042863
2006	1.157038539
2007	1.173971629
2008	1.190863679
2009	1.207740408
2010	1.224614327
2011	1.24149196



4. A local fundraising event for an end of semester party for algebra students sells π. All the students like algebra a lot, but anticipate being ready for a big party when the semester is finally over. They have been selling pieces of pie at noon each week. They tried two pricing levels to test the market and try to figure out what selling price will net them the most profit from their pie-sales. Their costs for the pie is \$3 for a **whole** six-piece pie. When the selling price was set at 75 cents a piece, they sold 100 pieces each week. When they charged \$1 a slice, they sold 75 pieces each week.
   a) Plot the information above where the x-coordinate represents number of pieces of pie that sell in a week and the y-coordinate represents the selling price per piece of pie in dollars. (2 pts)

   b) Assuming a linear relation between x and y, fill in the second and third rows of the table for the predicted the total number of tickets that will sell and the revenue from selling those pies when the ticket price is set at x\$. (2 pts)

x =# of pieces sold/wk\$	50	75	80	100
y = selling price in \$ per piece		\$1.00		\$0.75
$R(x)$ = \$ of revenue per week				

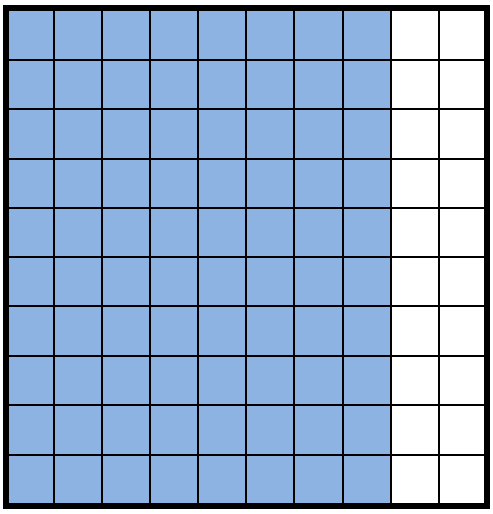
   c) Find the linear equation $y = mx + b$ that describes the linear relation in b.) (2 pts)

d) Use the formula for price from (c.) to find a formula for $R(x) =$ (an algebraic expression in the variable x. (2 pts)

e) Use the revenue formula $R(x)$ from (d.) and subtract the cost for buying the x pieces of pie to obtain a formula for the net earnings or profit per week. (2 pts)
$P(x) =$

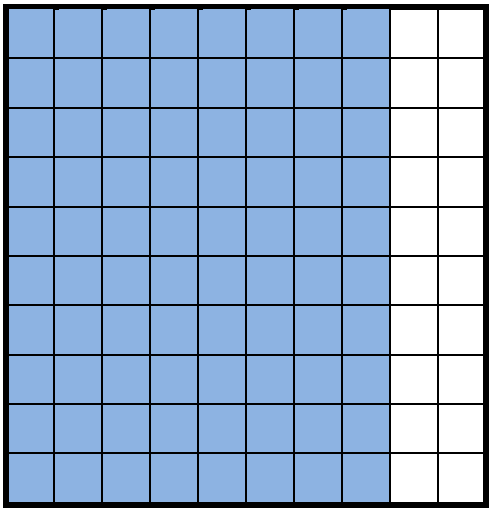
f) Plot points of the profit function for $0 \leq x \leq 100$ and predict the number you should sell per week and the selling price to get the largest profit. (3 pts)

5. A chemist has 100 liters of 20% sodium chloride solution. She intends to drain a certain number of liters and replace with a more concentrated solution. Use the 100% diagrams below to show how to solve each problem graphically. To get started, Determine how much the percentage of sodium chloride increases when a horizontal row of 10 liters is drained and replaced.



a. How much of this solution should she drain and replace with70% sodium chloride solution if she wants a 35% sodium chloride solution? (4 pts)

Also solve this problem algebraically. Start with stating exactly what the variable x represents: $x =$



b. How much of the 20% solution should she drain and replace with 50% sodium chloride solution if she wants a 35% sodium chloride solution? (4 pts)

Also solve this problem algebraically. Start with stating exactly what the variable x represents: $x =$

6. Let $A = 2 + 0.25t$, represent a linear relationship where A =amount of water in a bucket in liters and t = the number of minutes we have been adding water to the 5 liter capacity bucket.
    a. How much water is in the bucket after 5 minutes? (1 pt)

    b. How much water was in the bucket at the beginning before we began adding water? (1 pt)

    c. When will the bucket be completely full? (2 pts)

    d. What is the A-intercept? What is the significance of this intercept. (2 pts)

    e. What is the slope of this line? What is the physical significance of the slope? (2 pts)

7. Suppose today you bought a computer for $1200 today and this price was 20% off of yesterday's price.
    a. What was the price of the computer yesterday? Solve using strip diagrams only. (2 pts)

    b. Solve the same problem using an algebraic equation.(3 pts)