FINAL
MATH 113x

NAME:_____ April 17, 2017

For each problem, as in the homework, write an explanation to support your calculations and include references where appropriate. You may use resources such as course notes, textbook, and the internet to find the information needed to address the problems. **You are not to receive help from others on this assignment, including but not limited to, classmates, tutors, professors, roommates, etc.** If you have any questions, please send me an email or come by my office to ask your question. **This take-home portion is due Monday, May 1st, at the start of the final exam.** Good luck!

1. The following table contains data on the number of words in quotes used in this course's textbook:

number of words	number of quotes	number of words	number of quotes
10 to 20	11	140 to 150	3
20 to 30	33	150 to 160	2
30 to 40	24	160 to 170	1
40 to 50	26	170 to 180	1
50 to 60	21	180 to 190	0
60 to 70	23	190 to 200	0
70 to 80	10	200 to 210	1
80 to 90	9	210 to 220	1
90 to 100	9	220 to 230	0
100 to 110	6	230 to 240	0
110 to 120	6	240 to 250	1
120 to 130	2	150 to 260	0
130 to 140	1	260 to 270	1

(a) Create a properly labeled histogram displaying the data. You may sketch the histogram with pencil and paper, or use Excel.

(b) Calculate the total number of quotes.

(c) Estimate the total number of words in the quotes.

(d) Find the mode, median and mean quote sizes, and mark them on your histogram.

(e) Explain why the mean is the largest of the three averages.

2. In The Boston Globe on November 27, 2015 you could read that

Amid the holiday grocery shopping madness, every line feels like the wrong one. And yet, some are wronger than others. Given equally capable cashiers, you are often better off bypassing the express lane. Research conducted at a large, unnamed, California grocery store found that while each item adds 3 seconds to the check-out time, it takes 41 seconds for a person to move through the line even before their items are added to the tally. Bottom line: The big time-consumers are not the items, but the small talk and the paying, says Dan Meyer, who has a doctorate in math education from Stanford University.

(a) Write the linear equation showing how the time it takes a shopper to check out depends on the number of items in her cart. What are the slope and intercept, with their units?

(b) According to this article, how long will it take you to check out if you have 10 items in your cart?

(c) If the Express Lane has 7 people in line, each with about 10 items in their cart, while another lane has 4 people in line, each with about 15 items in their cart, which lane should you choose (ie, which lane will get you out of the store quicker)?

3. The data in the table below shows the life expectancy in years for several countries, along with the number of people per television set in those countries.

Country	Life Expectancy	People per Television	Country	Life Expectancy	People per Television
Argentina	70.5	4	Bangladesh	53.5	315
Brazil	65	4	Canada	76.5	1.7
China	70	8	Colombia	71	5.6
Egypt	60.5	15	Ethiopia	51.5	503
France	78	2.6	Germany	76	2.6
India	57.5	44	Indonesia	61	24
Iran	64.5	23	Italy	78.5	3.8
Japan	79	1.8	Kenya	61	96
Korea, North	70	90	Korea, South	70	4.9
Mexico	72	6.6	Morocco	64.5	21
Myanmar (Burma)	54.5	592	Pakistan	56.5	73
Peru	64.5	14	Philippines	64.5	8.8
Poland	73	3.9	Romania	72	6
Russia	69	3.2	South Africa	64	11
Spain	78.5	2.6	Sudan	53	23
Taiwan	75	3.2	Thailand	68.5	11
Turkey	70	5	Ukraine	70.5	3
United Kingdom	76	3	United States	75.5	1.3
Venezuela	74.5	5.6	Vietnam	65	29

(a) Which countries have the highest and lowest life expectancy at birth? Which have the highest and lowest number of people per television set?

(b) Use Excel to create a properly labelled scatter plot of the life expectancy and people per television data. Find the trendline and display the equation and the R-squared value on your graph.

(c) What is the slope of the trendline (with its units)? Explain its meaning in a sentence.

(d) Does a small number of people per television set improve health? Would people in countries with low life expectancy live longer if we sent them shiploads of television sets?

(e) Does living longer increase the number of television sets? If we improved the life expectancy in a country by providing better medical care would that cause there to be fewer people per television set?

(f) What else could be going on here? Why might high life expectancy be strongly correlated with a low ratio of people per tv set?

4. In an article dated April 1, 2011 on the website About.com you could read that

> With 1,210,000,000 (1.21 billion) people, India is currently the worlds second largest country.
> . . .
> Demographers expect Indias population to surpass the population of China, currently the most populous country in the world, by 2030. At that time, India is expected to have a population of more than 1.53 billion while Chinas population is forecast to be at its peak of 1.46 billion.
> . . .
> Although India has created several impressive goals to reduce its population growth rates, the India and the rest of the world has a long way to go to achieve meaningful population controls in this country with a growth rate of 1.6%, representing a doubling time of under 44 years.

(a) Is the article correct in stating that an annual growth rate of 1.6% means Indias population will double in 44 years? Back up your answer with appropriate calculations.

(b) Assuming that Indias growth rate remains 1.6% annually, what will its population be in 2030 when it surpasses Chinas?

(c) Assuming that Indias growth rate remains 1.6% annually from 2011 on, what will its population be in the year 2100? Compare that figure to the current population of the world. Do you think Indias growth rate can in fact continue at 1.6% for the 89 years from 2011 to 2100?

5. Suppose you finance a home purchase with a loan for $265,000 at an APR of 4.75% for 30 years.

(a) What will your monthly payments be?

(b) Create and attach an amortization schedule on Excel. At the end of the mortgage, how much have you paid in interest?

(c) Suppose you are able to put extra money toward your mortgage each month and end up paying monthly payments of $1450 toward your mortgage. How does this affect the duration of the loan? How much do you end up saving in interest?