Math In My Life

Fall 2020

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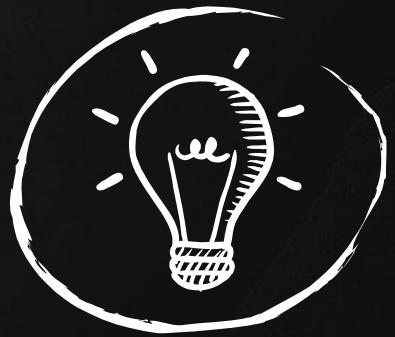
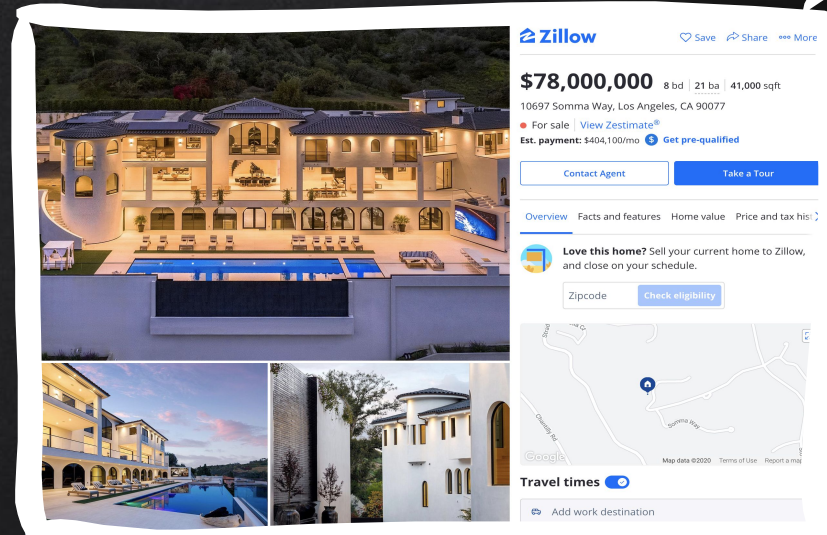


Concept #1

Description:

In an alternate dimension, where I can magically afford any house I want, I found this listing for my dream house. At 41,000 sq. feet, this home is listed at $78,000,000. Due to the exorbitant price, I will be financing this house. I will put down an earnest money deposit at 2% of sales price which would be $1,560,000. I found a mortgage rate that best suits me of 3% in order to pay it off in 5 years with a beginning savings amount of $100,000,000. I will be finding the payout annuity amount if I were to pay a portion of the remainder every month for said 5 years.



Concept #1

Concept Overview:

The math concept I am using for this problem is Payout Annuities Formula. The formula formula is: P=d(1−(1+r/k)^−nk) / (r/k)

Where P is the balance of the account at the beginning, d is the regular withdrawal, r is the annual interest rate, k is the number of compounding periods in one year, and n is the number of years I plan to take withdrawals from the account.

A payout annuity is when you begin with a certain amount of money in your account and make regular withdrawals of the same amount over a period of time. The money left in the account after the each withdrawal earns interest as well.

Application:

To find what the amount is that I would have to regularly withdrawal from the total in order to pay off the house in 5 years (subtracting the deposit from the original amount of the house), this is what the formulas would look like:

Original amount−deposit=Total left to pay
$78,000,000−$1,560,000=$76,440,000

P=d(1−(1+r/k)^−nk) / (r/k)

$76,440,000=d(1−(1+0.03/12)^−(5)*(12)) / (0.03/12)

Once the expression on the right is simplified it will be:

$76,440,000=d(0.1391)/(0.0025)

So d = $1,373,526.72 (rounded to nearest cent)

Implication

This means that if I had an account with $100,000,000 in it, and put down an earnest money deposit of 2% of $1,560,000, and found a mortgage rate at 3% for a $78,000,000 home, I will have to pay a monthly amount of $1,373,526.72.

Concept #2

Description:

In June 2021, I will be moving to Rennes, Brittany in order to pursue my Master's in business. I want to know what the percent change in pricing is for several common household items I will need to purchase while there. In order to better compare a percentage change, I found a site that has converted prices from Euros to Dollars that can give me a better idea of the price with the same unit of dollars instead of comparing to units and needing to convert them. These are the items I will be comparing.

A cappuccino

Internet

Public Transportation

Meal at an inexpensive restaurant

Source:
https://www.numbeo.com/cost-of-living/compare_cities.jsp?country1=United+States&country2=France&city1=Eugene%2C+OR&city2=Rennes&tracking=getDispatchComparison

Concept #2

Concept Overview:

The concept I am using for this problem is percentage increase. A percent directly translates to "parts per hundred" which makes it easy to understand that we are comparing to parts in order to get the part per hundred that increased or decreased. To find a percent increase I will find the original price and the price I am comparing. By using the formula of original price–price we are comparing, we will find the dollar amount of change between the two values. We can then divide that number by the original amount and get the percent change.

Application:

Price in Eugene: $4.19
Price in Rennes: $3.15
$4.19–$3.15=$1.04
$1.04/$4.19=24.82% decrease

Price in Eugene: $64.37/month
Price in Rennes: $32.80/month
$64.37–$32.80=$31.57
$31.57/$64.37=49.04% decrease per month

Price in Eugene: $1.75/ticket
Price in Rennes: $1.78/ticket
$1.78–$1.75=$0.03
$0.03/$1.75=1.714% increase per ticket

Price in Eugene: $11.00
Price in Rennes: $14.20
$11.00–$14.20=–3.2----->|–3.2|=3.2 (change is positive)
$3.2/$11.00=29.09% increase

Implication

As of today (assuming the conversion rates are constant and the inflation rates do not fluctuate):

A cappuccino is 24.82% less expensive than in Eugene.

Internet is 49.04% less expensive per month than in Eugene.

Public Transportation is 1.714% more expensive per ticket than in Eugene.

A meal at an inexpensive restaurant is 29.09% more expensive than in Eugene.

Concept #3

Description:

I recently watched a phenomenal documentary by Sir David Attenborough about the change he has experienced in the environment over his lifetime. In the documentary, he illustrates and explains data from year to year about the world population, the CO2 in the atmosphere, and the remaining wilderness around the world. I have organized the data in the table to the right with correct units and years. I will be representing this data in three seperate graphs to show the best fit for each data set in the hopes of illuminating readers about the severity of our impact.

Year	World Population (billions)	CO2 in Atmosphere (ppm)	Remaining Wilderness (%)
1937	2.3	280	66
1954	2.7	310	64
1978	4.3	335	55
1997	5.9	360	46
2020	7.8	415	35

Concept #3

Concept Overview:

The concept I will use for this is presenting data. In order to present data accurately, I need to know what the best graph would be to present it. The first question to ask is whether it is quantitative or categorical data. Next, I can choose a bar graph, Pareto chart, Histogram, pie chart, line graph, or any of the other graphs available to me. I would then enter the data into a table and use that to plot my graph, making sure I had the correct y-axis, x-axis, titles, increments, and range displayed. Presenting data in the best way allows me to take raw numbers that do not make sense to many, and visually represent it in a more clear way.

Application:

For my first graph of World Population (in billions), the data is quantitative. The best option for this graph would then be a bar graph. A pareto chart would not work because it is organized by largest to smallest instead of year. I took the data from the previous table and created a colorized chart that has world population on the y-axis and year on the x-axis (See next slide). The most logical increments for the x-axis are labeled as the individual years and for the y-axis, intervals of 2 billion people.

For the second graph of CO2 in atmosphere (ppm), the data is also quantitative. The best graph to represent this data would be either a bar graph or a line graph. To show a different type of data presentation I used a line graph. I took the data from that column in the table and plotted the points. Once the points were plotted I drew a connecting line to show the overall increase. The x-axis is years (by 10 years), and the y-axis is in ppm of CO2 in the atmosphere (by an increase of 50 ppm, starting at 250 ppm).

The last graph is the remaining wilderness left in the world (in %). The data is quantitative and would not be fit for a pie chart if combined as a whole. However, I believe that the data would best be presented if separated into individual pie charts by year that showed color coated sections of wilderness remaining and wilderness taken over. The percentages would be on the graph and the colors would be described in a key on the side.

IMPLICATION