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Math E-10, Precalculus

Problem Set 1

32.

(a).



|  |  |
| --- | --- |
| Lines (x) | Seconds (y) |
| 0 | 0 |
| 1 | 4 |
| 2 | 8 |
| 3 | 12 |
| 4 | 16 |
| 5 | 20 |
| 6 | 24 |
| 7 | 28 |
| 8 | 32 |
| 9 | 36 |
| 10 | 40 |

It takes Charles Osgood approximately 36 seconds to read 9 lines.

\*Note answers are rounded to nearest whole value.

(b).

(c). Charles Osgood can approximately read 9 lines in 36 seconds.

According to our equation from part (a): , and the above graph, if



One step further with simple algebra results in:



Therefore, in 30 seconds, Charles Osgood can read approximately 7.5 lines.

(d).

By simply renaming our variables, we can create a new formula from our above findings:



34.

(a).

|  |  |
| --- | --- |
| Cost in millions | Number of liters in millions |
| 2 | 0 |
| 2.5 | 1 |
| 3 | 2 |
| 3.5 | 3 |
| 4 | 4 |
| 4.5 | 5 |

(b).

Let C denote the cost in millions, and l denote the amount of liters produced in millions.



16.



(i).



(ii).



(iii).



20.

Let .



(i).



(ii).



(iii).



14.

(a). To provide evidence that C is a linear function, we check that the rate of change of C with respect to x is constant for the points given. When measuring how much the cost rose between selling 0 and 5 cups we get:

.



Which means that in our first interval, according to our data the cost rises by $0.25 for every additional cup of coffee. Moving on to gather further evidence that C is a linear function, we check the rate of change between 5 and 10 cups:

.



This further proves that C is a linear function, now onto the rate of change between 10 and 50 cups:



Our results are similar to the previous two trials, yet we are still not sure. Let us proceed to find the rate of change of the cost between 50 and 100 cups:



Measuring our final piece of data, we determine that it is still possible for C to be a linear function. One must note that we do not have enough evidence to reject a null hypothesis that claims C to be a linear, although it is possible. Indeed the function is linear between cups 0-200.

Conclusion:

, ¼, is constant thus C could be a linear function of x. Given additional data might not remain constant. However, based on the table, it appears that the function is linear.



(b).

(c). In order to find the slope of the line, we will be referring to part a of our solution. We need to calculate the total amount in which the cost rises, i.e. the difference between the cost of selling 200 cups and the cost of selling 0 cups:

.



Then we must determine the difference between our lowest amount of cups sold which is 0, and the maximum amount of 200:

.



When referring to rise, we are referring to , and when referring to the run.



The following formula describes the formula for the slope of the line. Let the slope be notated as m, and let b represent the y intercept:



(d). The reason it costs $50.00 to serve 0 cups of coffee, can be assumed as an initial start up cost. Such as; buying coffee grinds, hiring employees, or even advertising. This statistic can be calculated, and labeled the y-intercept (calculated above).

**Problem 16**

(a). Briefly looking at the data, it seems as if the perimeter has the properties of a linear function due. The constant increments of 4 bring reason to the argument. The area of the square seems to have more properties in which belong to an exponential function.

(b).

(c). The Perimeter of Square graph could possibly be a linear function, it increases by 4 for every side. Let the following formula represent the rate of change:



This means that the perimeter of the square increases by 4, for every increase of 1 unit in the length of the side.

24.

(a).



(b). First we assign the value 25,000 to *x* and plug it into our formula:



We then calculate 0.04% of 25,000, making sure to factor in 300 additional units of advertisement-free sales. This results in an expected sales volume of 400 units according to our data.

Moving onto the second part of (b). We can use the same methods as before except that this time we will input 50,000 into *x* rather than 25,000:



(c).



After setting up the equation, our first step is to calculate 700-300. This leaves us with 400 on the left side of the problem. Next we divide 400/0.004 in order to single out x. This leaves us with only 100,000 = x. Thus, $100,000 must be spent on advertising in order to sell 700 units.

(d). The slope of the line according to part (a) is as follows:



What this is basically saying is that for every $5,000 spent on advertising, the number of units sold increases by 20.

**Problem 32**.

Find a formula for the line intersecting the graph of at =1 and =3, where



.



When plugging 1 and 3 into the formula we get . This allows us to calculate the rate of change for both x and y values, resulting in a slope of



. Now because we already know that y is equal to 5 when x is 1, this allows us to setup the equation like so:



By doing this we’ve calculated the y-intercept. Now let us double check with the remaining y value of 1. Given we already knowwhen x is 3:



After putting it all together we get .



**Problem 34**

First we must identify the coordinates of the two points. The square with an area of 13’s coordinates is  and the squares with an area of 8’s coordinates is

**** . With this information we are able to do the following to calculate the slope: . Once we have that information we are able to find the y-intercept and complete our formula,



**Problem 38**

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(a). The membership fee is 55. And the average price per meal is 3.25.

(b). 

(c).



(d).



(e).



**Problem 42**

(a). The bottle’s velocity changes v feet per second every second. When v is 0, the bottle reaches it’s peak and begins free falling.

(b). 

(c). For every 1 second, the velocity changes by -32 feet per second.

(d). The t-intercept describes the initial velocity of the bottle, while the v-intercept describes the point in which the bottle reaches the highest point, then changes direction.

**Problem 16**

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**Problem 23**



**Found this interesting,**

