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MATH 101
Fall 2021
HW 4: Due 10/08

"I'm probably fine. But I also might be dead."

–Jessica Day, New Girl

Problem 1. (10pt) Compute the following:

(a) 60% of 180

(b) 20% of 90

(c) 87% of 1299

(d) 174% of 18

Solution.

(a) $180(0.60) = 108$

(b) $90(0.20) = 18$

(c) $1299(0.87) = 1130.13$

(d) $18(1.74) = 31.32$

Problem 2. (10pt) Compute the following:

(a) 70 increased by 20%

(b) 160 decreased by 35%

(c) 560 increased by 140%

(d) 44 decreased by 99%

Solution.

(a) $70(1 + 0.20) = 70(1.20) = 84$

(b) $160(1 - 0.35) = 160(0.65) = 104$

(c) $560(1 + 1.40) = 560(2.40) = 1344$

(d) $44(1 - 0.99) = 44(0.01) = 0.44$

Problem 3. (10pt) Convert the following:

(a) 100,000 in to miles [5280 ft $=$ 1 mi]

(b) 35 mi to km [1 mi $=$ 1.61 km]

(c) 3 mi^2 to in^2 [1 mi $=$ 5280 ft]

Solution.

(a)

$$\frac{100000\text{ in} \left| \begin{array}{r} 1\text{ ft} \\ \hline 12\text{ in} \end{array} \right. \left| \begin{array}{r} 1\text{ mi} \\ \hline 5280\text{ ft} \end{array} \right.}{} = 1.578\text{ mi}$$

(b)

$$\frac{35\text{ mi} \left| \begin{array}{r} 1.61\text{ km} \\ \hline 1\text{ mi} \end{array} \right.}{} = 56.35\text{ km}$$

(c)

$$\frac{3\text{ mi}^2 \left| \begin{array}{r} (5280\text{ ft})^2 \\ \hline (1\text{ mi})^2 \end{array} \right. \left| \begin{array}{r} (12\text{ in})^2 \\ \hline (1\text{ ft})^2 \end{array} \right.}{} = 12043468800\text{ in}^2$$

Problem 4. (10pt) Suppose you work a job where you are paid \$7.85/hr.

(a) How much do you make after working 40 hours?

(b) How much do you make after working 36.5 hours?

(c) How many *whole* hours would you have to work to make \$800?

Solution.

(a)

$$40\ hr \cdot \$7.85/hr = \$314$$

(b)

$$36.5\ hr \cdot \$7.85/hr = \$286.525 \approx \$286.53$$

(c)

$$x\ hr \cdot \$7.85/hr = \$800$$

$$x = \frac{\$800}{\$7.85/hr}$$

$$x = 101.91\ hr$$

Therefore, one would have to work 102 hours.

Problem 5. (10pt) Suppose you work a job where you make $9.50/hr for the first 40 regular hours you work. After that, you make time and a half, i.e. you make 50% more per hour.

(a) How much do you make if you work 35 hours in a week?

(b) How much do you make if you work 45 hours in a week?

(c) Suppose you start work at 8:41 am and leave at 4:32 pm. How much have you make that day?

Solution.

(a)

$$35\ \textit{hr} \cdot \$9.50\textit{/hr} = \$332.50$$

(b) For the first 40 hrs, you make $9.50/hr. For the last 5 hrs, you make time and a half, i.e. $\$9.50\textit{/hr}(1 + 0.50) = \$9.50\textit{/hr}(1.50) = \$14.25\textit{/hr}$*. Then one makes...*

$$40\ \textit{hr} \cdot \$9.50\textit{/hr} + 5\ \textit{hr} \cdot \$14.50\textit{/hr} = \$380 + \$72.50 = \$452.50$$

(c) The time from 8:41 am until 4:32 pm is 7 hours and 51 minutes. That is $7 + \frac{51}{60} = 7.85$ *hours. But then one makes...*

$$7.85 \cdot \$9.50\textit{/hr} = \$74.575 \approx \$74.58$$

Problem 6. (10pt) Suppose you work at a car dealership where you are paid on commission, i.e. you are paid based on how much you sell. The dealership pays you either a weekly salary of \$800/week or 6.5% of whatever you sell that week—whichever is greater.

(a) How much are you paid if you have \$8,411.37 in sales that week?

(b) How much are you paid if you have \$12,567.96 in sales that week?

(c) At least how much would you have to sell (to the nearest dollar) in order to make your base-rate weekly salary?

(d) Suppose you sold deck sets that cost \$250. Based on your answer from (c), how many deck sets would you have to sell each week in order to make more than your base weekly salary?

Solution.

(a) We know that 6.5% of your sales for the week is $\$8411.37(0.065) = \$546.74$. *Because this is less than one's baselines salary of \$800, the salary for the week is \$800.*

(b) We know that 6.5% of your sales for the week is $\$12567.96(0.065) = \$816.92$. *Because this is less than one's baselines salary of \$800, the salary for the week is \$816.92.*

(c) We want to know the amount of sales, say x*, so that* $x(0.065) = \$800$. *But then* $x = \frac{\$800}{0.065} = \$12307.69$. *Therefore, one would have to make at least \$12,307.69 in sales that week to make as much as one's base rate salary.*

(d) To make the base rate salary, one needs \$12307.69 in sales. Because each deck set costs \$250, one would need to sell at least $\frac{12307.69}{250} = 49.23$ *deck sets. This means one need sell either 49 or 50 deck sets. Selling less deck sets would result in less sales. Therefore, one need sell 50 deck sets.*