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MATH 101
Spring 2024
HW 6: Due 02/12

"I don't know, Marge. Trying is the first step towards failure."
— Homer Simpson, The Simpsons

Problem 1. (10pts) Showing all your work, compute the following:

(a) 86% of 920

(b) 4% of 77

(c) 180% of 9

Solution. We use the fact that to find a % of a number N, ones computes $N \cdot \%_d$, where $\%_d$ is the percentage written as a decimal.

(a)

$$86\% \text{ of } 920 = 920(0.86) = 791.2$$

(b)

$$4\% \text{ of } 77 = 77(0.04) = 3.08$$

(c)

$$180\% \text{ of } 9 = 9(1.80) = 16.2$$

Problem 2. (10pts) Showing all your work, compute the following:

(a) 600 decreased by 45%

(b) 88 increased by 34%

(c) 1,450 increased by 111%

Solution. We use the fact that to increase or decrease a number N by a percentage %, ones computes $N(1 \pm \%_d)$, where $\%_d$ is the percentage as a decimal and one chooses '$+$' if a percentage increase and '$-$' if a percentage decrease.

(a)

$$\text{600 decreased by 45\%} = 600(1 - 0.45) = 600(0.55) = 330$$

(b)

$$\text{88 increased by 34\%} = 88(1 + 0.34) = 88(1.34) = 117.92$$

(c)

$$\text{1,450 increased by 111\%} = 1{,}450(1 + 1.11) = 1450(2.11) = 3{,}059.5$$

Problem 3. (10pts) Your biology class course grade is determined by the following components:

Homeworks	60%
Quizzes	5%
Midterm	15%
Final	20%

Suppose that your homework average was 91%, your quiz average was 81%, your midterm average was 79%, and your final exam average was 86%.

(a) Compute your course average.

(b) If the final exam had not yet occurred, i.e. you had not yet received the 86%, but all the other course grades were as listed above, then what is your current course average?

Solution.

(a) We have...

$$\begin{aligned}
\text{Overall Course Average} &= \frac{\sum w_i x_i}{\sum w_i} \\
&= \frac{0.60 \cdot 0.91 + 0.05 \cdot 0.81 + 0.15 \cdot 0.79 + 0.20 \cdot 0.86}{0.60 + 0.05 + 0.15 + 0.20} \\
&= \frac{0.546 + 0.0405 + 0.1185 + 0.172}{0.60 + 0.05 + 0.15 + 0.20} \\
&= \frac{0.877}{1} \\
&= 0.877 \\
&= 87.7\%
\end{aligned}$$

(b) We have...

$$\begin{aligned}
\text{Current Course Average} &= \frac{\sum w_i x_i}{\sum w_i} \\
&= \frac{0.60 \cdot 0.91 + 0.05 \cdot 0.81 + 0.15 \cdot 0.79}{0.60 + 0.05 + 0.15 + 0.20} \\
&= \frac{0.546 + 0.0405 + 0.1185}{0.60 + 0.05 + 0.15} \\
&= \frac{0.705}{0.80} \\
&= 0.88125 \\
&= 88.125\%
\end{aligned}$$