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**MATH 101**
**Fall 2023**
**HW 6: Due 10/02**

*"I see the muscle shirt came today. Muscles coming tomorrow? Did ya' get a tracking number? Oh, I hope he got a tracking number."*

*— Daryl, Letterkenny*

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

(a) 83% of 1,295

(b) 3% of 920

(c) 99% of 67

(d) 165% of 81

(e) 20% of 45.30

**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)
$$83\% \text{ of } 1{,}295 = 1295(0.83) = 1074.85$$

(b)
$$3\% \text{ of } 920 = 290(0.03) = 27.6$$

(c)
$$99\% \text{ of } 67 = 67(0.99) = 66.33$$

(d)
$$165\% \text{ of } 81 = 81(1.65) = 133.65$$

(e)
$$20\% \text{ of } 45.30 = 45.30(0.20) = 9.06$$

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

(a) 560 increased by 4%

(b) 357 decreased by 23%

(c) 993 decreased by 95%

(d) 55 increased by 105%

(e) 89.4 increased by 224%

**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)
$$560 \text{ increased by } 4\% = 560(1 + 0.04) = 560(1.04) = 582.4$$

(b)
$$357 \text{ decreased by } 23\% = 357(1 - 0.23) = 357(0.77) = 274.89$$

(c)
$$993 \text{ decreased by } 95\% = 993(1 - 0.95) = 993(0.05) = 49.65$$

(d)
$$55 \text{ increased by } 105\% = 55(1 + 1.05) = 55(2.05) = 112.75$$

(e)
$$89.4 \text{ increased by } 224\% = 89.4(1 + 2.24) = 89.4(3.24) = 289.656$$

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

| | |
|---|---|
| Homeworks | 30% |
| Labs | 20% |
| Midterm | 20% |
| Final | 20% |
| Project | 10% |

Suppose that your homework average was 86%, your lab average was 75%, your midterm average was 68%, your final grade was 81%, and your project grade was 92%.

(a) Compute your course average.

(b) If the final exam had not yet occurred, i.e. you had not yet received the 81%, but all the other course grades were as listed above, then what is your current course average?

**Solution.**

(a) We have...

$$\text{Overall Course Average} = \frac{\sum w_i x_i}{\sum w_i}$$

$$= \frac{0.30 \cdot 0.86 + 0.20 \cdot 0.75 + 0.20 \cdot 0.68 + 0.20 \cdot 0.81 + 0.10 \cdot 0.92}{0.30 + 0.20 + 0.20 + 0.20 + 0.10}$$

$$= \frac{0.30 \cdot 0.86 + 0.20 \cdot 0.75 + 0.20 \cdot 0.68 + 0.20 \cdot 0.81 + 0.10 \cdot 0.92}{1}$$

$$= 0.258 + 0.15 + 0.136 + 0.162 + 0.092$$

$$= 0.798$$

$$= 79.8\%$$

(b) We have...

$$\text{Current Course Average} = \frac{\sum w_i x_i}{\sum w_i}$$

$$= \frac{0.30 \cdot 0.86 + 0.20 \cdot 0.75 + 0.20 \cdot 0.68 + 0.10 \cdot 0.92}{0.30 + 0.20 + 0.20 + 0.10}$$

$$= \frac{0.30 \cdot 0.86 + 0.20 \cdot 0.75 + 0.20 \cdot 0.68 + 0.10 \cdot 0.92}{0.80}$$

$$= \frac{0.258 + 0.15 + 0.136 + 0.092}{0.80}$$

$$= \frac{0.636}{0.80}$$

$$= 0.795$$

$$= 79.5\%$$

**Problem 4.** (10pt) Suppose you received the following grades this semester:

| Course | Credits | Grade |
|---|---|---|
| CS 320: Ethics in a Technological Society | 3 | C+ |
| CS 380: Networking | 4 | B+ |
| CS485: Web Programming | 3 | B− |
| CS 424: Data Mining | 3 | A− |
| ECON 101: Principles of Macroeconomics | 3 | A |

Given the following grade values,

| Grade | Values | Grade | Values |
|---|---|---|---|
| A | 4.0 | C+ | 2.3 |
| A− | 3.7 | C | 2.0 |
| B+ | 3.3 | C− | 1.7 |
| B | 3.0 | D | 1.0 |
| B− | 2.7 | F | 0 |

(a) Compute your semester GPA.

(b) If your previous GPA based on 76 credits was 3.012, what is your current overall GPA?

**Solution.**

(a) We have...

$$\text{Semester GPA} = \frac{\sum w_i x_i}{\sum w_i}$$
$$= \frac{3 \cdot 2.3 + 4 \cdot 3.3 + 3 \cdot 2.7 + 3 \cdot 3.7 + 3 \cdot 4.0}{3 + 4 + 3 + 3 + 3}$$
$$= \frac{6.9 + 13.2 + 8.1 + 11.1 + 12}{16}$$
$$= \frac{51.3}{16}$$
$$\approx 3.206$$

(b) We have...

$$\text{Overall GPA} = \frac{\text{Previous Credits} \cdot \text{Previous GPA} + \text{Semester Credits} \cdot \text{Semester GPA}}{\text{Overall Credits}}$$
$$= \frac{76 \cdot 3.012 + 16 \cdot 3.206}{76 + 16}$$
$$= \frac{228.912 + 51.296}{92}$$
$$= \frac{280.208}{92}$$
$$\approx 3.046$$