

MPA Math Refresher 2022

Session 1

Practice Problem on Analysis of Data

Suppose a pilot version of a new policy has been tested in several states. The policy provides each recipient with one of three levels of benefit: high = \$100, medium = \$50, or low = \$25. The number of people participating in each state are shown below:

Table 1: Participants by State and Benefit Level

State	High	Medium	Low
Arizona (AZ)	22	50	70
California (CA)	75	42	45
Florida (FL)	49	25	50
Illinois (IL)	22	62	45
Pennsylvania (PA)	67	25	81
Texas (TX)	64	88	65
Total	299	292	356

(a): What was the total *dollar amount* spent on the policy?

(b): What percentage of the benefits went to high benefit participants? Please round to the nearest percent.

(c): Draw a set of axes below and then sketch a bar graph that shows the number of participants in Pennsylvania who receive each level of benefit.

(d): Suppose that total number of participants in California doubles but all other states remain the same. What is the percentage change in the total number of participants? Please round to the nearest tenth of a percent.

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Practice Problems on Exponents and the Order of Operations

- (a): Evaluate the following when $x = \$2M$ and $y = \$6M$ and report the results in millions rounded to the nearest ten thousand dollars.

$$\left(\frac{1}{2}x^2 + \frac{1}{2}y^2\right)^{0.5} = ?$$

- (b): Evaluate the following when $r = 10\%$ and report the results in millions of dollars rounded to the nearest hundred thousand dollars.

$$\sum_{t=0}^2 \frac{\$1M}{(1+r)^t} = ?$$

- (c): Evaluate the following when $y = 2$ and report the results to the nearest tenth:

$$2000 * (3 + y^3)^{-1} = ?$$

- (d): Evaluate the following when $a = 0.5$, $PVI = \$260$ thousand, and $r = 5\%$ and report the results in thousands of dollars without rounding:

$$C = \frac{(1-a) * PVI}{\frac{1}{1+r}} = ?$$

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(e): Evaluate the following when $F = \$127$ million, $r = 5\%$, and $T = 40$ and report the results in billions rounded to the nearest hundred million:

$$V = \frac{F}{r} \left(1 - \frac{1}{(1+r)^T} \right) = ?$$

(f): Evaluate the following when $u = 100$, $P_x = 100$ and $P_y = 25$:

$$M = 2uP_x^{0.5}P_y^{0.5} + 50P_x = ?$$

(g): Evaluate the following when $p_1 = 0.1$, $p_2 = 0.6$, $p_3 = 0.3$ and $x_1 = \$100$, $x_2 = \$10$, $x_3 = -\$1$:

$$\sum_{i=1}^3 p_i x_i = ?$$