

CS23 Assignment Three

CJ Bridgman-Ford
cj.ikaika@gmail.com

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1 Is $(1, 2, 3, 4) = (1, 2, 4, 3)$?

No. Unlike sets, the order of elements in a tuple matters.

2 Which of the following are equivalent:

$\{a, b, c\}$, $\{\{a, b\}, c\}$, (a, b, c) , $(a, (b, c))$, (b, c, a) ,
 $\{\{a, b, c\}\}$, $\{b, c, a\}$, $\{\}$, $\{\{\}\}$

$\{a, b, c\}$ is equivalent to $\{b, c, a\}$. All other tuples and sets are inequivalent due to differences in structure or order of elements.

3 Let $A = \{2, 3, 4\}$ and $B = \{6, 8, 10\}$ and define a relation R from A to B as follows: For every $(x, y) \in A \times B$, $(x, y) \in R$ means that $\frac{y}{x}$ is an integer.

a. Is $4R6$? Is $4R8$? Is $(3, 8) \in R$? Is $(2, 10) \in R$?

$\frac{6}{4} = 1.5$ is not an integer. Therefore, $4R6$ is not true. $\frac{8}{4} = 2$ is an integer. Therefore, $4R8$ is true. $\frac{8}{3}$ is not an integer. Therefore, $(3, 8) \in R$ is not true. $\frac{10}{2} = 5$ is an integer. Therefore, $(2, 10) \in R$ is true.

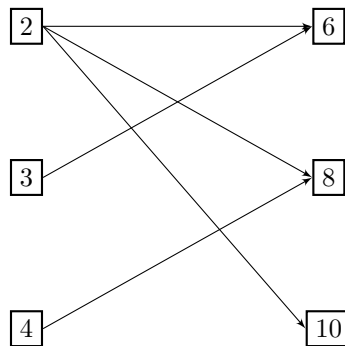
b. Write R as a set of ordered pairs.

$R = \{(2, 6), (2, 8), (2, 10), (3, 6), (4, 8)\}$.

c. Write the domain and co-domain of R .

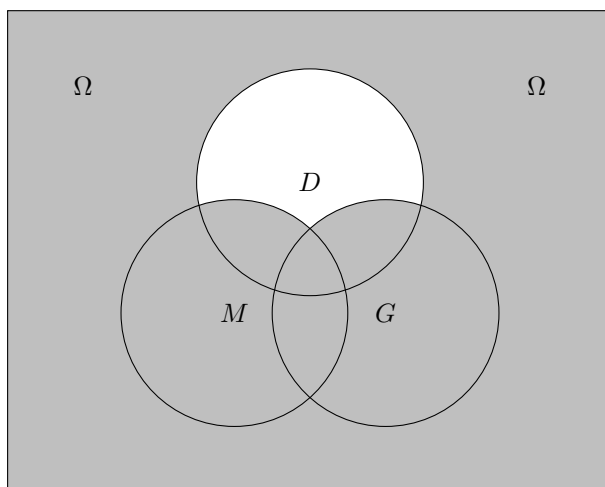
The domain of R is A and the co-domain is B .

d. Draw an arrow diagram for R .

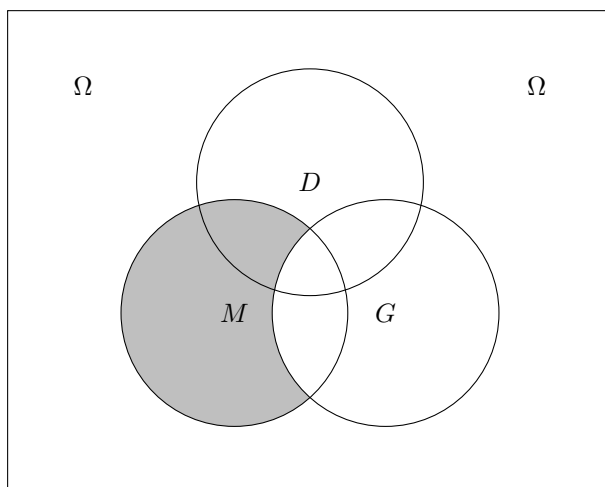


4 Given that Ω = all students in university, D = day students, M = mathematics majors, and G = graduate students, draw a venn diagram for this situation and copy it once for each of the given problems. Shade the following sets.

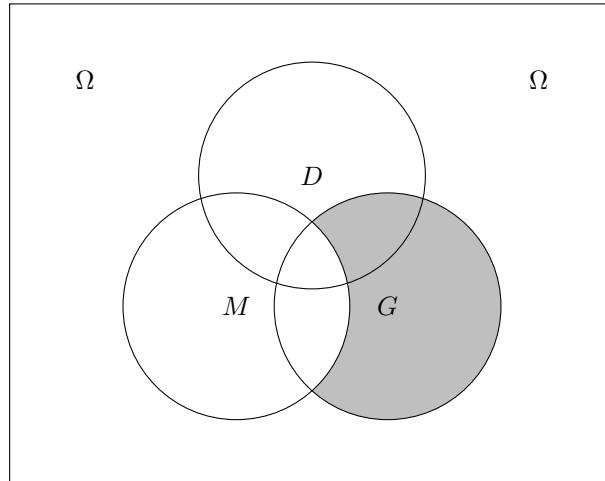
a. Evening and online students:



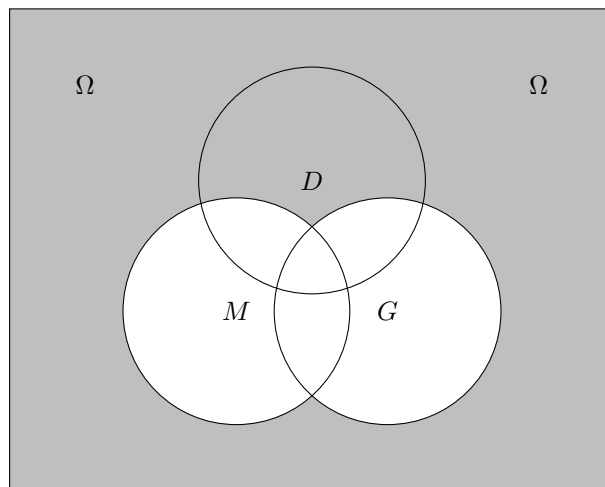
b. Undergraduate mathematics majors:



c. Non-math graduate students:



d. Non-math undergraduate students:



5 Two faces of a six sided dice are painted red, two are painted green and two are painted blue. The dice is rolled three times and the colors are recorded.

- a. List the 27 possible outcomes in the format RGB (1st, 2nd, 3rd roll).

RRR, RRG, RRB, RGR, RGG, RGB, RBR, RBG, RBB, GRR, GRG, GRB, GGR, GGG, GGB, GBR, GBG, GBB, BRR, BRG, BRB, BGR, BGG, BGB, BBR, BBG, BBB.

- b. Consider the event where all three rolls produce a different color. One outcome in the event is RGB. List all outcomes in the event and its probability.

RGB, GRB, GBR, BGR, RBG, BRG. $\frac{6}{27}$ gives us a 22.2% probability.

- c. Consider the event where all two of the three rolls produce the same color. One outcome in the event is RRB. List all outcomes in the event and its probability.

RRG, RRB, RGR, RGG, RBR, RBB, GRR, GRG, GGR, GGB, GBG, GBB, BRR, BRB, BGG, BGB, BRR, BBG. $\frac{18}{27}$ gives us a 67.7% probability.