

Consider randomly selecting an engineer from a certain company. Let A be the event that he has a Mastercard. Let B be the event that he has an American Express card. Suppose that  $P(A) = 0.4$   $P(B) = 0.5$

$$P(A \cap B) = 0.7$$

Represent the following events in set theoretic notation using A, B complementation and union and intersection symbols in the space provided. Then find the probability that the given event occurs (4 points-each part)

1. The engineer has both kinds of credit card.

Event  $A \cap B$  \_\_\_\_\_

Probability Calculation

$$\begin{aligned} P(A \cap B) &= P(A) + P(B) - P(A \cup B) \\ &= .4 + .5 - .7 = .2 \end{aligned}$$

2. The engineer does not have a Master Card card.

Event  $A^c$  \_\_\_\_\_

Probability Calculation

$$P(A^c) = 1 - P(A) = 1 - .4 = .6$$

3. The engineer does not have an American Express card but has a Master Card.

Event  $A \cap B^c$  \_\_\_\_\_

Probability Calculation

$$\begin{aligned} P(A \cap B^c) &= P(A) - P(A \cap B) \\ &= .4 - .2 = .2 \end{aligned}$$

4. The engineer has exactly one kind of credit card.

Event  $(A \cap B^c) \cup (A^c \cap B)$  \_\_\_\_\_

Probability Calculation

$$\begin{aligned} P[(A \cap B^c) \cup (A^c \cap B)] &= P(A \cap B^c) + P(A^c \cap B) \\ &= .2 + .2 = .4 \end{aligned}$$

5. The engineer does not have a Master card and does not have an American Express Card.

Event  $(A \cap B)^c$  \_\_\_\_\_

Probability Calculation

$$P((A \cap B)^c) = 1 - P(A \cap B) = 1 - .7 = .3$$