

Business Calculus II Test III

Name: Answer

1. (Grade Distribution) The grade distribution for a certain class is shown in the following table. Find the probability distribution associated with these data.

Grade	A	B	C	D	F
Frequency of Occurrence	4	10	18	6	2

$$4 + 10 + 18 + 6 + 2 = 40$$

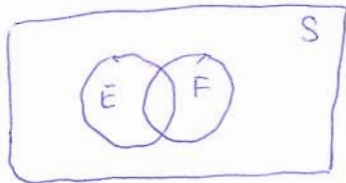
$$P(A) = \frac{4}{40} = 0.1, \quad P(B) = \frac{10}{40} = 0.25, \quad P(C) = \frac{18}{40} = 0.45$$

$$P(D) = \frac{6}{40} = 0.15, \quad P(F) = \frac{2}{40} = 0.05$$

2. Let E and F be events of an experiment with sample space S . Suppose $P(E) = 0.4$, $P(F) = 0.5$, and $P(E \cap F) = 0.1$. Compute: a. $P(E \cup F)$ b. $P(E \cap F^c)$

a. $P(E \cup F) = P(E) + P(F) - P(E \cap F) = 0.4 + 0.5 - 0.1 = 0.8$

b. $P(E \cap F^c) = P(E) - P(E \cap F) = 0.4 - 0.1 = 0.3$



3. Four balls are selected at random without replacement from an urn containing 10 white balls and 8 red balls. What is the probability that all the chosen balls are white?

The probability is
$$\frac{C(10, 4)}{C(18, 4)} = \frac{\frac{10!}{4!6!}}{\frac{18!}{4!14!}} = \frac{10 \cdot 9 \cdot 8 \cdot 7}{18 \cdot 17 \cdot 16 \cdot 15}$$

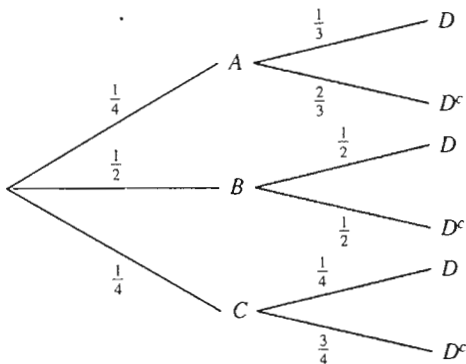
$$= \frac{7}{102} \approx 0.0686$$

4. Let A and B be events in a sample space S such that $P(A) = 0.4$, $P(B) = 0.8$, and $P(A \cap B) = 0.3$. Find: a. $P(A|B)$ b. $P(B|A)$

$$a. P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.3}{0.8} = 0.375$$

$$b. P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{0.3}{0.4} = 0.75$$

5. The accompanying tree diagram represents a two-stage experiment. Use the diagram to find $P(B|D)$.



$$P(B|D) = \frac{P(B \cap D)}{P(D)} = \frac{P(B \cap D)}{P(A \cap D) + P(B \cap D) + P(C \cap D)}$$

$$= \frac{P(B) P(D|B)}{P(A) P(D|A) + P(B) P(D|B) + P(C) P(D|C)}$$

$$= \frac{(\frac{1}{2})(\frac{1}{2})}{(\frac{1}{4})(\frac{1}{3}) + (\frac{1}{2})(\frac{1}{2}) + (\frac{1}{4})(\frac{1}{4})}$$

$$= \frac{12}{19}$$