Solutions

Math 321-01 Spring 2015
Quiz 1 21.01.15

Name: _____

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible; You have 20 minutes to take this 10 point quiz.

1. (*5 points*) Suppose that three events - A, B, and C - are defined on a sample space S. Use union, intersection, and complement operations to represent each of the following:

(a) none of the three events occurs

$A^c \cap B^c \cap C^c$

(b) all three of the events occur

$A \cap B \cap C$

(c) only event A occurs

$A \cap B^c \cap C^c$

(d) exactly one event occurs

$(A \cap B^c \cap C^c) \cup (B \cap A^c \cap C^c) \cup (C \cap A^c \cap B^c)$

(e) exactly two event occurs

$(A \cap B \cap C^c) \cup (B \cap C \cap A^c) \cup (A \cap C \cap B^c)$

2. (*5 points*) Suppose that an urn contains 3 red balls and 2 green balls. A ball is drawn from the urn randomly (with all possibilities equally likely), and then a second ball is drawn randomly.

(a) Describe the sample space S of the experiment.

$S = \{ r_1r_2, r_1r_3, r_2r_3, r_3r_2, r_2r_1, r_3r_1, g_1g_2, g_2g_1, r_1g_1, r_1g_2,$
$r_2g_1, r_2g_2, r_3g_1, r_3g_2, g_1r_1, g_1r_2, g_1r_3, g_2r_1, g_2r_2, g_2r_3 \}$

(b) What is the probability of getting two balls with the same color? Justify!

A = two balls the same color

$A = \{ r_1r_2, r_1r_3, r_2r_3, r_3r_2, r_2r_1, r_3r_1, g_1g_2, g_2g_1 \}$

$$P(A) = \frac{N(A)}{N(S)} = \frac{8}{20} = \frac{2}{5} = 0.4$$

(c) What is the probability of getting one ball of each color? Justify!

B = two ball different color.

Clearly $B = A^c$, so

$$P(B) = P(A^c) = 1 - P(A) = 1 - \frac{2}{5} = \frac{3}{5} = 0.6$$