NAME: SOLUTIONS **SET:** _____

Quiz 3D
Probability

Give probabilities to 4 significant figures.

1. [3] A student has 11 identical green socks and 6 identical brown socks in a drawer. If the student grabs two socks at random, what is the probability that the socks match?

$$P(\text{socks match}) = P[(G_1 \cap G_2) \cup (B_1 \cap B_2)]$$
$$= P(G_1)P(G_2|G_1) + P(B_1)P(B_2|B_1)$$
$$= \frac{11}{17} \cdot \frac{10}{16} + \frac{6}{17} \cdot \frac{5}{16}$$
$$= 0.5147$$

2. [3] An online service randomly generates passwords that consist of 7 capital letters. What is the probability that a password contains no vowels (the vowels are A, E, I, O, and U)?

$$P(\text{no vowels}) = \frac{\#\text{passwords with no vowels}}{\#\text{passwords}}$$
$$= \frac{(26-5)^7}{26^7}$$
$$= 0.2242$$

3. On any given day, the probability that a student enrolled in MATH 3042 is self-isolating is 0.08, and the probability that a student enrolled in MATH 3042 watches an online lecture is 0.12. The probability that a student is self-isolating and watches an online lecture is 0.010.

   a. [2] Are self-isolating and watching an online lecture independent events? Explain briefly (a short sentence with a bit of math is enough).

$P(\text{isolate} \cap \text{lecture}) = 0.010$

$P(\text{isolate})P(\text{lecture}) = 0.08 \cdot 0.12 = 0.0096 \neq 0.010$

$\Rightarrow$ not independent

   b. [2] What is the probability that on a particular day, a student is either self-isolating or watching an online lecture, **but not both**?

$$P(\text{isolate} \cup \text{lecture}) = P(\text{isolate}) + P(\text{lecture}) - 2P(\text{isolate} \cap \text{lecture})$$
$$= 0.08 + 0.12 - 2 \cdot 0.010$$
$$= 0.18$$

NAME: SOLUTIONS **SET:** _____

Quiz 3S
Probability

Give probabilities to 4 significant figures.

1. [3] A student has 10 identical green socks and 5 identical brown socks in a drawer. If the student grabs two socks at random, what is the probability that the socks match?

$$P(\text{socks match}) = P[(G_1 \cap G_2) \cup (B_1 \cap B_2)]$$
$$= P(G_1)P(G_2|G_1) + P(B_1)P(B_2|B_1)$$
$$= \frac{10}{15} \cdot \frac{9}{14} + \frac{5}{15} \cdot \frac{4}{14}$$
$$= 0.5258$$

2. [3] An online service randomly generates passwords that consist of 9 capital letters. What is the probability that a password contains no vowels (the vowels are A, E, I, O, and U)?

$$P(\text{no vowels}) = \frac{\#\text{passwords with no vowels}}{\#\text{passwords}}$$
$$= \frac{(26-5)^9}{26^9}$$
$$= 0.1463$$

3. On any given day, the probability that a student enrolled in MATH 3042 is self-isolating is 0.09, and the probability that a student enrolled in MATH 3042 watches an online lecture is 0.11. The probability that a student is self-isolating and watches an online lecture is 0.010.

   a. [2] Are self-isolating and watching an online lecture independent events? Explain briefly (a short sentence with a bit of math is enough).

$$P(\text{isolate})P(\text{lecture}) = 0.09 \cdot 0.11 = 0.0099$$
$$P(\text{isolate} \cap \text{lecture}) = 0.010 \neq 0.0099$$
$$\Rightarrow \text{not independent}$$

   b. [2] What is the probability that on a particular day, a student is either self-isolating or watching an online lecture, **but not both**?

$$P(\text{isolate} \cup \text{lecture}) = P(\text{isolate}) + P(\text{lecture}) - 2P(\text{isolate} \cap \text{lecture})$$
$$= 0.09 + 0.11 - 2 \cdot 0.010$$
$$= 0.18$$

MATH 3042 – APPLIED PROBABILITY AND STATISTICS FOR COMPUTER SYSTEMS TECHNOLOGY

NAME: SOLUTIONS SET: ____

Quiz 3M
Probability

Give probabilities to 4 significant figures.

1. [3] A student has 12 identical green socks and 8 identical brown socks in a drawer. If the student grabs two socks at random, what is the probability that the socks match?

$$P(\text{socks match}) = P[(G_1 \cap G_2) \cup (B_1 \cap B_2)]$$
$$= P(G_1)P(G_2|G_1) + P(B_1)P(B_2|B_1)$$
$$= \frac{12}{20}\cdot\frac{11}{19} + \frac{8}{20}\cdot\frac{7}{20}$$
$$= 0.4947$$

2. [3] An online service randomly generates passwords that consist of 11 capital letters. What is the probability that a password contains no vowels (the vowels are A, E, I, O, and U)?

$$P(\text{no vowels}) = \frac{\#\text{passwords with no vowels}}{\#\text{passwords}}$$
$$= \frac{(26-5)^{11}}{26^{11}}$$
$$= 0.09543$$

3. On any given day, the probability that a student enrolled in MATH 3042 is self-isolating is 0.07, and the probability that a student enrolled in MATH 3042 watches an online lecture is 0.13. The probability that a student is self-isolating and watches an online lecture is 0.010.

   a. [2] Are self-isolating and watching an online lecture independent events? Explain briefly (a short sentence with a bit of math is enough).

$$P(\text{isolate})P(\text{lecture}) = 0.07\cdot 0.13 = 0.0091$$
$$P(\text{isolate} \cap \text{lecture}) = 0.010 \neq 0.0091$$
$$\Rightarrow \text{not independent}$$

   b. [2] What is the probability that on a particular day, a student is either self-isolating or watching an online lecture, **but not both**?

$$P(\text{isolate} \cup \text{lecture}) = P(\text{isolate}) + P(\text{lecture}) - 2P(\text{isolate} \cap \text{lecture})$$
$$= 0.07 + 0.13 - 2\cdot 0.010$$
$$= 0.18$$

NAME: SOLUTIONS **SET:** ____

Quiz 3V
Probability

Give probabilities to 4 significant figures.

1. [3] A student has 13 identical green socks and 7 identical brown socks in a drawer. If the student grabs two socks at random, what is the probability that the socks match?

$$P(\text{socks match}) = P[(G_1 \cap G_2) \cup (B_1 \cap B_2)]$$
$$= P(G_1)P(G_2|G_1) + P(B_1)P(B_2|B_1)$$
$$= \frac{13}{20}\cdot\frac{12}{19} + \frac{7}{20}\cdot\frac{6}{19}$$
$$= 0.5210$$

2. [3] An online service randomly generates passwords that consist of 13 capital letters. What is the probability that a password contains no vowels (the vowels are A, E, I, O, and U)?

$$P(\text{no vowels}) = \frac{\#\text{passwords with no vowels}}{\#\text{passwords}}$$
$$= \frac{(26-5)^{13}}{26^{13}}$$
$$= 0.06226$$

3. On any given day, the probability that a student enrolled in MATH 3042 is self-isolating is 0.06, and the probability that a student enrolled in MATH 3042 watches an online lecture is 0.14. The probability that a student is self-isolating and watches an online lecture is 0.010.

   a. [2] Are self-isolating and watching an online lecture independent events? Explain briefly (a short sentence with a bit of math is enough).

$$P(\text{isolate})P(\text{lecture}) = 0.06\cdot 0.14 = 0.0084$$
$$P(\text{isolate} \cap \text{lecture}) = 0.010 \neq 0.0084$$
$$\Rightarrow \text{not independent}$$

   b. [2] What is the probability that on a particular day, a student is either self-isolating or watching an online lecture, **but not both**?

$$P(\text{isolate} \cup \text{lecture}) = P(\text{isolate}) + P(\text{lecture}) - 2P(\text{isolate} \cap \text{lecture})$$
$$= 0.06 + 0.14 - 2\cdot 0.01$$
$$= 0.18$$