

HOMEWORK
BIOSTATISTICS (STAT:3510; BOGNAR)

1. Suppose a die is rolled one time. Let

$$A = \text{roll a 1} \quad B = \text{roll an even}$$

- (a) Are A and B mutually exclusive? Why?
- (b) Are A and B independent? Why?

2. Suppose that 20% of UI students smoke (S), while 30% drink alcohol (A). In addition, 15% smoke *and* drink alcohol.

- (a) Given that a student drinks alcohol (A), determine the probability that he/she smokes (S), i.e. find $P(S|A)$.
- (b) Are alcohol use and smoking independent? Why?

3. Suppose a die is rolled. Consider the following events:

$$A = 2, 4 \text{ or } 6 \text{ is rolled}$$

$$B = 1, 2 \text{ or } 5 \text{ is rolled}$$

$$C = 3 \text{ or } 5 \text{ is rolled}$$

- (a) Are A and B mutually exclusive? Why?
- (b) Are A and C mutually exclusive? Why?
- (c) Find $P(A|B)$
- (d) Find $P(B \cup C)$.
- (e) Are A and B independent? Why?
- (f) Are B and C independent? Why?

4. Suppose events A and B are independent where $P(A) = 0.3$ and $P(B|A) = 0.5$. Find $P(A \cup B)$.

5. Suppose events A and B are mutually exclusive where $P(A) = 0.5$ and $P(B) = 0.2$. What is $P(A \cap B)$?

6. Suppose a box contains 12 silver coins (S) and 3 gold coins (G).

- (a) If you randomly select 2 coins *without* replacement, determine the probability that the first coin is silver (S_1) *and* the second coin is gold (G_2).
- (b) Suppose you randomly select 2 coins *without* replacement. Use the complement rule to find the probability that 1 or fewer gold coins are selected.
- (c) If you randomly select 2 coins *without* replacement, determine the probability that you obtain exactly 1 gold coin (G). *Hint: $P[(G_1 \cap S_2) \cup (\dots)]$.*