Name: _____ Date: _____

PSTAT 5A: Homework 03

Summer Session B 2025, with *Annie Adams*

1. Consider the random variable X with the following probability mass function (p.m.f):

k	- 2.4	-0.2	0	4
P(X = k)	0.1	0.4	a	0.2

where **a** is an as-of-yet unknown constant.

(a) What is the value of **a**?

(b) What is $\mathbb{P}(-2.4 \leq X < 0.2)$?

(c) What is $\mathbb{P}(X \geq 0)$?

(d) What is $\mathbb{E}[X]$?

(e) What is $\mathrm{Var}(X)$?

2. The weight of a randomly-selected fish from *Lake Gaucho* (in pounds) is normally distributed with mean 4 lbs and standard deviation 1.3 lbs. A fish is selected at random from *Lake Gaucho* and its weight is recorded.

(a) Define the random variable of interest.

(b) What is the probability that this fish weighs less than 2 pounds?

(c) What is the probability that this fish weighs between 2.5 lbs and 3.8 lbs?

(d) Suppose, now, that a random sample of 10 fish is caught (assume that the weights of fish in *Lake Gaucho* are independent), and the number of fish that weigh between 2.5 and 3.8 lbs is recorded. What is the probability that exactly 3 of these fish weigh between 2.5 and 3.8 lbs? **Hint:** you will need to define another random variable.

3. Suppose that 33% of a particular country's population has a college degree. A representative sample of 243 people is taken, and the proportion of these people who have a college degree is recorded.

(a) Define the parameter of interest.

(b) Define the random variable of interest. Use proper notation.

(c) Check whether the success-failure conditions are satisfied.

(d) What is the probability that over 30% of the sample have college degrees?

(e) What is the probability that the proportion of people in the sample with college degrees lies within 5% of the true proportion of 33%?