# ENGR 200 – Chapter 3 Discrete Distributions Homework

## Set 1 – Homework (Required)

Q1: A materials engineer measures surface flaws on wire. Historical data indicate an average of 2.3 flaws per mm. For a 5 mm segment, what is the expected count parameter λ?

Q2: Using the same wire segment as Q1, what is the probability of exactly 10 flaws?

Q3: A 3D printer produces parts with independent defect probability 5% per part. If a batch has 20 parts, what is the expected number of defects?

Q4: For the same 20‑part batch, what is the probability that exactly 2 parts are defective?

Q5: A fair die is rolled 10 times during a lab demo. What is the expected number of sixes?

Q6: In the same demo, what is the probability of exactly 3 sixes?

Q7: A student guesses on a 5‑question multiple‑choice quiz with 4 options each (one correct). What is the probability of getting all 5 correct by guessing?

Q8: For the same quiz, what is the probability of getting exactly 2 correct by guessing?

Q9: A campus arrivals process is modeled as Poisson with mean 4. What is the variance?

Q10: Suppose X is the number correct on a 10‑item clicker quiz, with independent success probability 0.3 each question. What are the mean and variance of X?

## Set 2 – Homework (Optional)

Q1: The campus IT help desk logs ticket arrivals. Their data show an average of about 3 tickets per hour during midterms. During a randomly chosen hour, what is the probability exactly 5 tickets arrive?

Q2: For the same help desk hour, what is the probability of at least 5 tickets?

Q3: A student team inspects 100 3D‑printed clips. Past data show a defect rate of about 2% per clip, independently. Approximate the probability the batch has 3 or more defects.

Q4: A robotics team tests a flaky sensor by flipping a fair coin until the first head to simulate a 'success' event. What is the probability it takes exactly 4 flips?

Q5: You try to log in to a busy lab server; each try succeeds with probability 0.2 (independent). What is the expected number of tries until the first success?

Q6: An electronics lab repeats a pass/fail soldering test with success probability 0.4 each attempt, independently. What is the probability the 3rd success occurs on the 7th attempt?

Q7: A quality‑control die used in a game lab lands on six with probability 0.1 (independent across rolls). In 15 rolls, what is the probability of exactly 2 sixes?

Q8: The campus call center logs a mean of 12 calls per hour around registration deadlines. During a random hour that week, what is the probability there are fewer than 10 calls?

Q9: In a programming quiz of 20 auto‑graded items, a student answers each correctly with probability 0.4 (independent). What are the mean and variance of the total correct?

Q10: A laser cutter queue averages 9 jobs per hour. Assuming a Poisson model, what is the probability the next hour sees exactly 9 job submissions?