# AP Statistics Practice Free Response — Chapters 7 and 8

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X.

| X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| P(X) | .1 | .2 | .3 | .3 | |

   (a) Find P(X = 5).

   (b) Find the probability that the pain score is less than 3.

   (c) Find the probability that the pain score is greater than 3.

   (d) Find the mean μ for this distribution.

2. Amarillo Slim, a professional dart player, has an 80% chance of hitting the *bull's-eye* on a dartboard with any throw. Suppose that he throws 10 darts, one at a time, at the dartboard.

   (a) Find the probability that Slim hits the bull's-eye exactly six times.

   (b) Find the probability that he hits the bull's-eye at least four times.

   (c) Compute the expected number of bull's-eyes in 10 throws.

   (d) Find the probability that Slim's first bull's-eye occurs on the fourth throw.

   (e) Find the probability that it takes Amarillo more than 2 throws to hit the bullseye.

3. Harlan comes to class one day, totally unprepared for a pop quiz consisting of ten multiple-choice questions. Each question has five answer choices, and Harlan answers each question randomly.

   (a) Find the probability that Harlan's gets more than 5 questions right out of 10.

   (b) Find the probability that Harlan's first correct answer occurs after the fourth question.

   (c) Find the expected number of questions required for Harlan to get his first correct answer.

   (d) Find the probability that Harlan guesses more answers correctly than would be expected by chance.

# AP Statistics Practice Free Response - ANSWERS Chapters 7 and 8

1. Patients receiving artificial knees often experience pain after surgery. The pain is measured on a subjective scale with possible values of 1 to 5. Assume that X is a random variable representing the pain score for a randomly elected patient. The following table gives part of the probability distribution for X.

| X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| P(X) | .1 | .2 | .3 | .3 | |

(a) Find P(X = 5). **1 – (.1 + .2 + .3 +.3) = 1 - .9 = .1**

(b) Find the probability that the pain score is less than 3. **P(x<3) = .1 + .2 = .3**

(c) Find the probability that the pain score is greater than 3. **P(x>3) = .3 + .1 = .4**

(d) Find the mean μ for this distribution. **$\mu = \Sigma x_i p_i$ = 1(.1) + 2(.2 ) + 3(.3 ) + 4(.3 ) + 5(.1 ) = 3.1**

2. Amarillo Slim, a professional dart player, has an 80% chance of hitting the *bull's-eye* on a dartboard with any throw. Suppose that he throws 10 darts, one at a time, at the dartboard.

(a) Find the probability that Slim hits the bull's-eye exactly six times. **binompdf(10, .8, 6)** = **.088**

(b) Find the probability that he hits the bull's-eye at least four times. **1-binomcdf(10, .8, 3)** = **.999**

(c) Compute the expected number of bull's-eyes in 10 throws. **μ = np = 10(.8) = 8**

(d) Find the probability that Slim's first bull's-eye occurs on the fourth throw.

**geometpdf(.8, 4)** = **.0064**

(e) Find the probability that it takes Amarillo more than 2 throws to hit the bullseye.

**P(x>2) = $(.2)^2$ = .04 OR 1 - geometcdf(.8, 2) = .04**

3. Harlan comes to class one day, totally unprepared for a pop quiz consisting of ten multiple-choice questions. Each question has five answer choices, and Harlan answers each question randomly.

(a) Find the probability that Harlan's gets more than 5 questions right out of 10.

**P(x>5) = 1 – binomcdf(10, .2, 5) = .0064**

(b) Find the probability that Harlan's first correct answer occurs after the fourth question.

**P(x>4) = $(.8)^4$ = .4096 OR 1 - geometcdf(.2, 4) = .4096**

(c) Find the expected number of questions required for Harlan to get his first correct answer.

**μ = 1 / p = 1 / .2 = 5**

(d) Find the probability that Harlan guesses more answers correctly than would be expected by chance. **Since μ = np = 10(.2) = 2: P(x>2) = 1 - binomcdf(10,.2, 2)** = **.322**