Statistics project example

Be sure to show your work in case partial credit is awarded. To receive full credit, work must be shown if applicable. Section 5 Introduction to Normal Distribution and the Standard Normal Distribution

1. Use the Standard Normal Distribution table to find the indicated area under the standard normal curve.

(1 points per each part)

a. Between z = 0 and z = 1. 24

Area to the left of z = 0 is P(z < 0) = 0. 5

Area to the left of z = 1. 24 is P(z < 1. 24) = 0. 8925

Therefore,

P(0 < z < 1. 24) = P(z < 1. 24) – P(z < 0) = 0. 8925 – 0. 5 = 0. 3925

b. To the left of z = 1. 68

Area to the left of z = 1. 68 is P(z < 0) = 0. 9535

c. Between z = -1. 52 and z = -0. 64

Area to the left of z = -1. 52 is P(z < -1. 52) = 0. 0643

Area to the left of z = -0. 64 is P(z < -0. 64) = 0. 2611

Therefore,

P(-1. 52 < z < -0. 64) = P(z < -0. 64) – P(z < -1. 52) = 0. 2611 – 0. 0643 = 0. 1968

d. To the right of z = -1. 54

Area to the left of z = -1. 54 is P(z < -1. 54) = 0. 0618

Therefore,

Area to the right of z = -1. 54 is P(z > -1. 54) = 1 – 0. 0618 = 0. 9382

Section 5. 2: Normal Distributions: Find Probabilities

2. The diameters of a wooden dowel produced by a new machine are normally distributed with a mean of 0. 55 inches and a standard deviation of

0. 01 inches. What percent of the dowels will have a diameter less than 0. 57?

(5 points)

Mean, μ = 0. 55 inches, standard deviation, σ = 0. 01 inches

Area to the left of z = 2. 0 is P(z < 2) = 0. 9772

Therefore,

P(X < 0. 57) = P(z < 2. 0) = 0. 9772 or 97. 72%

About 97. 72% of the dowels will have a diameter less than 0. 57.

3. A loan officer rates applicants for credit. Ratings are normally distributed. The mean is 240 and the standard deviation is 50. Find the probability that an applicant will have a rating greater than 300.

(5 points)

Mean, μ = 240, standard deviation, σ = 50

Area to the left of z = 1. 2 is P(z < 1. 2) = 0. 8849

Therefore,

Area to the right of z = 1. 2 is P(z > 1. 2) = 1 – 0. 8849 = 0. 1151

Therefore,

P(X > 300) = P(z > 1. 2) = 0. 1151 or 11. 51%

The probability that an applicant will have a rating greater than 300 is about 0. 1151 (or 11. 51%).

Section 5. 3: Normal Distributions: Finding Values

4. Answer the questions about the specified normal distribution.

a. The lifetime of ZZZ batteries are normally distributed with a mean of 265 hours and a standard deviation ? of 10 hours. Find the number of hours that represent the 40th percentile. (3 points)

Mean, μ = 265 hours, standard deviation, σ = 10 hours

The z value for the 40th percentile (Area to the left is 0. 40) is -0. 2533.

Therefore,

The number of hours that represent the 40th percentile is about 262. 47 hours.

b. Scores on an English placement test are normally distributed with a mean of 36 and standard deviation ? of 6. 5. Find the score that marks the top 5%. (3 points)

Mean, μ = 36, standard deviation, σ = 6. 5

The z value for the top 5% (Area to the left is 1 – 0. 05 = 0. 95) is 1. 645.

The score that marks the top 5% is about 46. 7.

Section 5. 4: Sampling Distribution and the Central Limit Theorem

5. Find the probabilities.

a. From National Weather Service records, the annual snowfall in the TopKick Mountains has a mean of 92 inches and a standard deviation ? of 12 inches. If the snowfall from 25 randomly selected years are chosen, what it the probability that the snowfall would be less than 95 inches?

(5 points)

Mean, μ = 92 inches, standard deviation, σ = 12 inches, n = 25

Area to the left of z = 1. 25 is P(z < 1. 25) = 0. 8944

P(< 95) = P(z < 1. 25) = 0. 8944 or 89. 44%

The probability that the snowfall would be less than 95 inches is about 0. 8944 (or 89. 44%).

b. The loan officer rates applicants for credit. Ratings are normally distributed. The mean is 240 and the standard deviation is 60. If 36 applicants are randomly chosen, what is the probability that they will have a rating between 230 and 260? (5 points)

Mean, $\mu = 240$, standard deviation, $\sigma = 60$, $n = 36$

Area to the left of z = -1 is $P(z < -1) = 0.1587$

Area to the left of z = 2 is $P(z < 2) = 0.9772$

Therefore,

P(230 < < 260)

$= P(-1 < z < 2) = P(z < 2) – P(z < -1) = 0.9772 – 0.1587 = 0.8186$

The probability that they will have a rating between 230 and 260 is about 0. 8186 (or 81. 86%).