Quiz 4

① This is a preview of the published version of the quiz

Started: Jan 8 at 1:37pm

Quiz Instructions

This quiz must be taken in person during the set time in class. If you take the quiz at some other time or outside of the classroom, then you may not earn credit for your answers/work.

Question 1	**1 pts**

(Objective 4a: Standard Normal Variables)

Let z be the standard normal variable. Find the following, and round your answer to two decimal places:

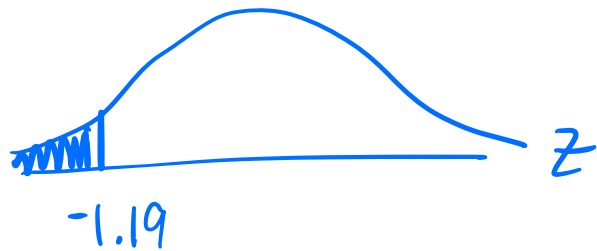1. $P(Z \leq -1.19)$. ⟦0.12⟧

2. $P(-1.95 < Z < -0.01)$. ⟦0.47⟧

3. z^* such that $P(Z \geq z^*) = 0.4$. ⟦0.25⟧

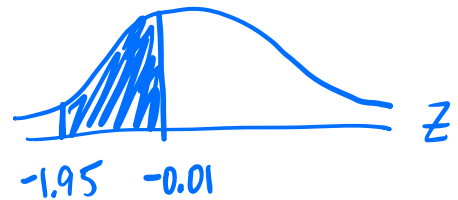4. z^* such that $P(-z^* < Z < z^*) = 0.87$. ⟦1.51⟧

1. $P(Z \leq -1.19)$

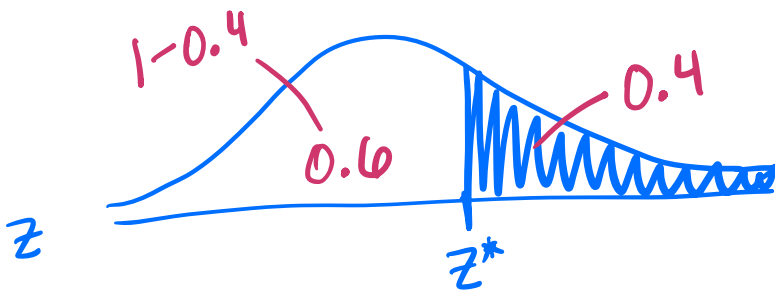$= \text{NORM.S.DIST}(-1.19, 1)$

$\approx \boxed{0.12}$

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2. $P(-1.95 < Z < -0.01)$

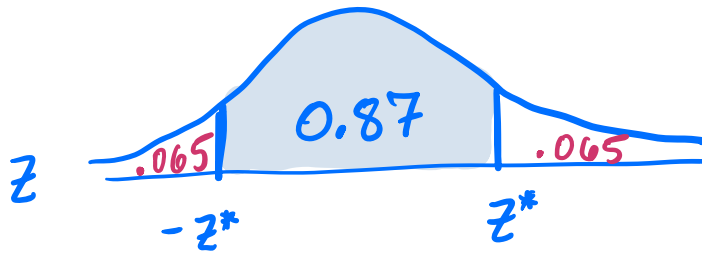$= \text{NORM.S.DIST}(-0.01, 1) - \text{NORM.S.DIST}(-1.95, 1)$

$\approx \boxed{0.47}$

3.

$z^* = \text{NORM.S.INV}(0.6)$

$\approx \boxed{0.25}$

4. $P(-z^* < Z < z^*) = 0.87$

$1 - 0.87 = 0.13$

$\dfrac{0.13}{2} = 0.065$

$z^* = \text{NORM.S.INV}(0.87 + 0.065)$

$\approx \boxed{1.51}$

Question 2   1 pts

(Objective 4b: General Normal Distribution)

Suppose the braking distance of cars of a certain model travelling at 60 mph is normally distributed with mean 134.03 feet and standard deviation 6.66 feet. Find the following, and round each of your answers to two decimal points:

1. Find the probability that a randomly selected car's braking

   distance is ▮ at most 142.46 feet. 0.90

2. Find the probability that a randomly selected car's braking
   distance is between 120.38 and 134.63 feet.

   0.52

3. Find X^* such that the probability that a randomly selected car's
   braking distance is ▮ at least X^* feet is 29%.

   137.72

4. Find k such that the probability that a randomly selected car's
   braking distance is between $134.03 - k$ feet and $134.03 + k$

   feet is 35%. 3.02

$M = 134.03$

$\sigma = 6.66$

1.

$P(X \leq 142.46)$

$= \text{NORM.DIST}(142.46, 134.03, 6.66, 1)$

$\approx \boxed{0.90}$

X — 134.03 142.46

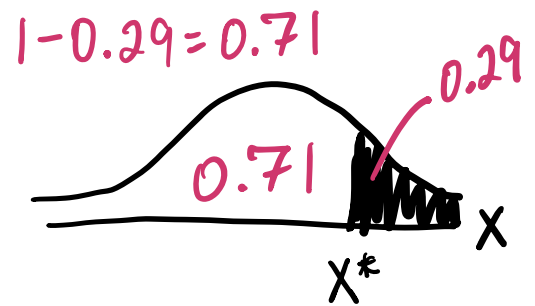
2. $P(120.38 \leq X \leq 134.63)$

$= \text{NORM.DIST}(134.63, 134.03, 6.66, 1)$

$- \text{NORM.DIST}(120.38, 134.03, 6.66, 1)$

$\approx \boxed{0.52}$

3. $P(X \geq X^*) = 0.29$

$1 - 0.29 = 0.71$

0.29

0.71

X^*

X

$X^* = \text{NORM.INV}(0.71, 134.03, 6.66)$

$\approx \boxed{137.72}$

4.

0.35

0.325

0.325

134.03−k
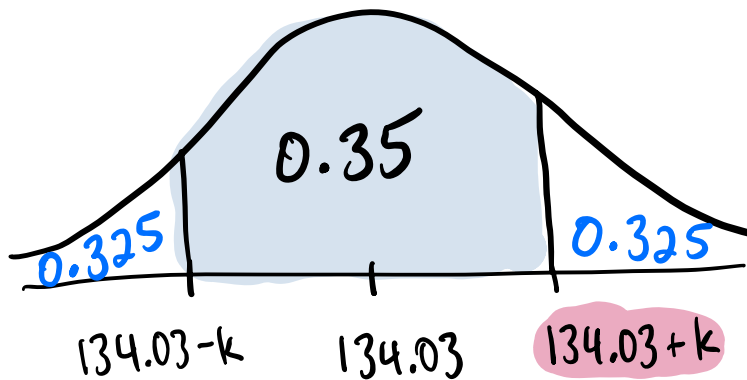
134.03

134.03+k

$1 - 0.35 = 0.65$

$\dfrac{0.65}{2} = 0.325$

$k = \text{NORM.INV}(0.35 + 0.325, 134.03, 6.66) - 134.03$

$\approx \boxed{3.02}$

Question 3   1 pts

(Objective 4c: Binomial Distribution)

Suppose a group of people are in a room for extended time with someone infected with a novel virus. Each of the 8 people has a 0.3 chance of contracting the virus. Suppose that whether or not each person contract the virus is independent of the other people.

Find the following, and round each of your answers to three decimal points:

1. What is the probability that 2 people contract the virus?

   0.296

2. What is the probability that 4 people contract the virus?

   0.136

3. What is the probability that less than 7 people contract the virus?

   0.999

4. What is the probability that between 5 and 7 (inclusive) people contract the virus?   0.058

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$n = 8$

$p = 0.3$

1. What is the probability that 2 people contract the virus?

$$P(X = 2) = BINOM.DIST(2, 8, 0.3, FALSE)$$

$$\approx \boxed{0.296}$$

2. What is the probability that 4 people contract the virus?

$$P(X = 4) = BINOM.DIST(4, 8, 0.3, FALSE)$$

$$\approx \boxed{0.136}$$

3. What is the probability that less than 7 people contract the virus?

$$P(X < 7) = P(X \leq 6) = BINOM.DIST(6, 8, 0.3, TRUE)$$

$$\approx \boxed{0.999}$$

4. What is the probability that between 5 and 7 (inclusive) people contract the virus?

$$P(5 \leq X \leq 7) = P(X = 5) + P(X = 6) + P(X = 7)$$

$$= BINOM.DIST(5, 8, 0.3, FALSE)$$

$$+ BINOM.DIST(6, 8, 0.3, FALSE)$$

$$+ BINOM.DIST(7, 8, 0.3, FALSE)$$

$$\approx \boxed{0.058}$$

$\boxed{\text{OR}}$

$P(5 \leq X \leq 7) = P(X \leq 7) - P(X \leq 4)$

$= \text{BINOM.DIST}(7,8,0.3,\text{TRUE}) - \text{BINOM.DIST}(4,8,0.3,\text{TRUE})$

≈ 0.058