Day 6 Homework Answers

1.
   a. 0.0336

   b. 0.0668

   c. 4.39504

   d. 5.88694

2.
   a. -0.8871

   b. 18,750

   c. 0.5405

   d. 12.648 mpg

   e. 34.99838 mpg

Formula → $\widehat{z}$ → normalcdf

Value
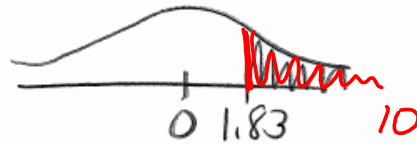mean
SD

%

Formula ← $\widehat{z}$ ← invnorm
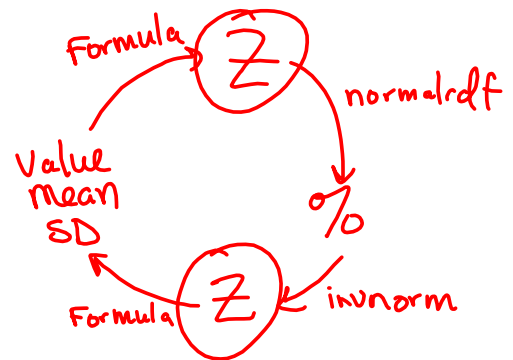
1. Based on long-term investigation, researchers have suggested that the acidity (pH) of rainfall in the Shenandoah Mountains can be described by the Normal model N(4.9, 0.6).

   a. What percent of storms produce rainfall with pH over 6?

   $$Z = \frac{6-4.9}{.6} = 1.83$$

   normalcdf(1.83, 10)
   $$P(Z > 1.83) = .0336$$
   3.36%

   b. What percent of storms produce rainfall with pH under 4?

   $$Z = \frac{4-4.9}{.6} = -1.5$$

   normalcdf(-10, -1.5)
   $$P(Z < -1.5) = .0668$$
   6.68%

   c. The lower the pH, the more acidic the rain. What is the pH level for the most acidic 20% of all storms?

   $$Z = \text{InvNorm}(.2) = -.8416$$

   $$-.8416 = \frac{x-4.9}{.6}$$

   $$-.50496 = x - 4.9$$

   $$x = 4.39504$$

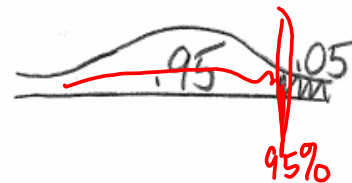   d. What is the pH level for the least acidic 5% of all storms?

   $$Z = \text{InvNorm}(.95) = 1.6449$$

   $$1.6449 = \frac{x-4.9}{.6}$$
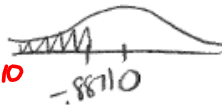
   $$.98694 = x - 4.9$$

   $$x = 5.88694$$

2. Environmental Protection Agency (EPA) fuel economy estimates for automobile models tested recently predicted a mean of 24.8 mpg and a standard deviation of 6.2 mpg for highway driving. Assume that a Normal model can be applied.

a. About what percent of autos should get less than 19.3 mpg?

$$Z = \frac{19.3 - 24.8}{6.2} = -.8871$$

normalcdf(-10, -.8871)

$$P(Z < -.8871) = .1875$$

18.75%

b. If they tested 100,000 autos, how many autos would have had less than 19.3 mpg?

$$100,000(.1875) = 18,750 \text{ cars}$$

c. About what percent of autos should get between 18.4 and 27.9 mpg?

$$Z = \frac{18.4 - 24.8}{6.2} = -1.0323$$

$$Z = \frac{27.9 - 24.8}{6.2} = .5$$

normalcdf(-1.0323, .5)

Prob = .5405

54%

d. What's the gas mileage of the worst 2.5% of all cars?

$$Z = INVNORM(.025) = -1.96$$

$$-1.96 = \frac{X - 24.8}{6.2}$$

$$-12.152 = X - 24.8$$

$$X = 12.648 \text{ mpg}$$

e. What's the gas mileage of the best 5% of all cars?

$$Z = Inv Norm(.95) = 1.6449$$

$$1.6449 = \frac{X - 24.8}{6.2}$$

$$10.19838 = X - 24.8$$

$$X = 34.99838 \text{ mpg}$$

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https://www.youtube.com/watch?v=6YDHBFVlvls

https://www.mathsisfun.com/data/quincunx.html

https://www.youtube.com/watch?v=3m4bxse2JEQ

https://fivethirtyeight.com/features/what-if-god-were-a-giant-game-of-plinko/?ex_cid=538twitter

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