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Problem 1

Given:

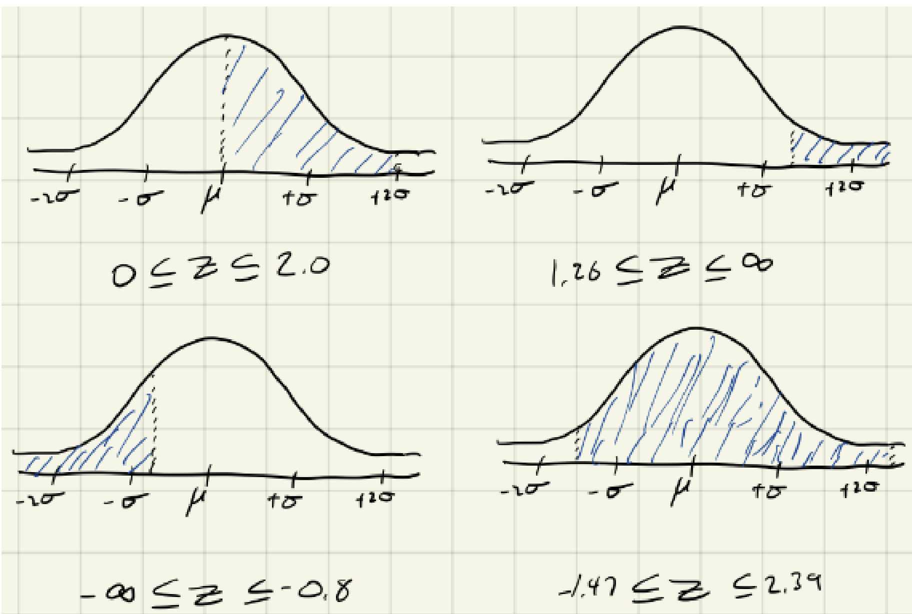
The following z score ranges:

- Between z = 0 and z = 2.0
- To the right of z = 1.26
- To the left of z = - 0.8
- Between z = -1.47 and z = 2.39

Find:

The area under the normal distribution curve for the given z score ranges

Diagram:



Theory:

Use z score

Z = (value – mean) / stdev

Assumptions:

Working with normal distribution

Solution:

Used ti-84 calculator

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Between $z=0$ and $z=2.0$: normalcdf$(0, 2, 0, 1) = 0.477249$

Right of $z=1.26$: normalcdf$(1.26, 1E99, 0, 1) = 0.103834$

Left of $z=-0.8$: normalcdf$(-1E99, -0.8, 0, 1) = 0.211855$

Between $z=-1.47$ and $z=2.39$: normalcdf$(-1.47, 2.39, 0, 1) = 0.920794$

Problem 2

Given:

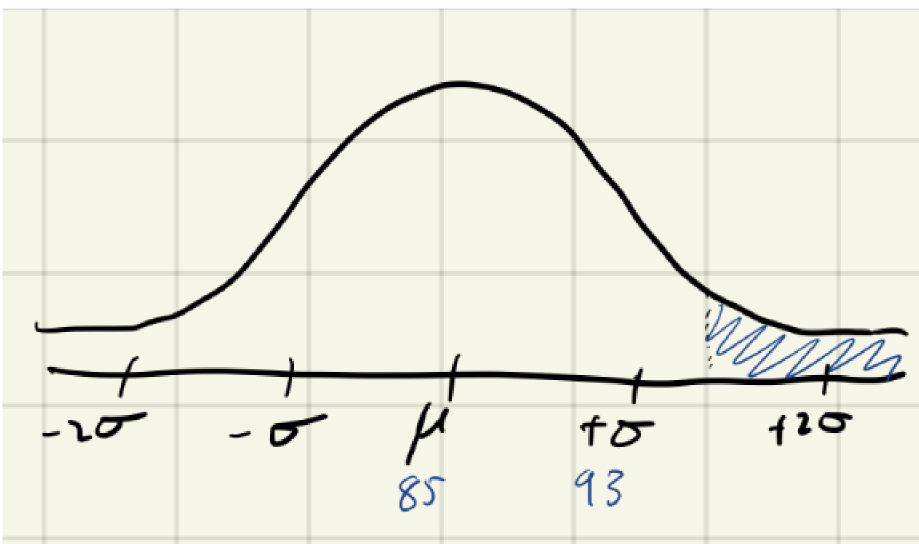
Mean = 85

Standard deviation = 8.0

Find:

Probability of choosing a score of 95 or higher on the distribution

Diagram:



Theory:

Z score = (observed value – mean) / standard deviation

Probability = area under normal curve from z = (95-85)/8 to infinity

Assumptions:

scores are approximately normally distributed

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Solution:

Used ti-84 calculator

$$z = \frac{95-85}{8} = 1.25$$

$$P(z > 1.25) = \text{normalcdf}(95, 1E99, 85, 8) = 0.105649$$

Problem 3

Given:

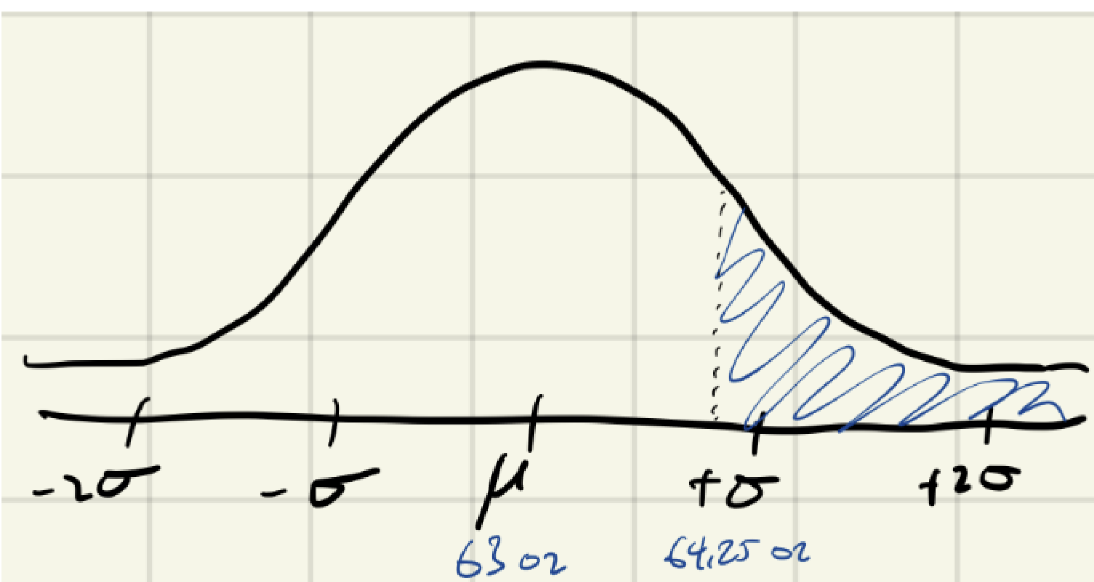
Mean = 63.0 oz

Standard deviation = 1.25 oz

Find:

Probability of a z score higher than (64-63)/1.25

Diagram:



Theory:

Use z score

Z = (value – mean) / stdev

Assumptions:

The amount of soda dispensed approximately follows a normal distribution.

Solution:

Used ti-84 calculator

$$z = \frac{64-63}{1.25} = 0.8$$

$$P(z > 0.8) = \text{normalcdf}(64, 1E99, 63, 1.25) = 0.211855$$

Problem 4

Given:

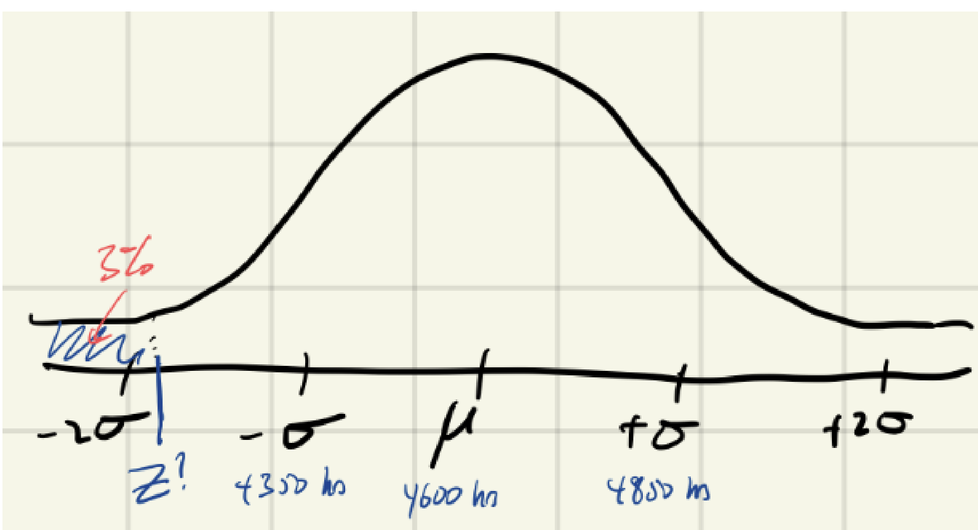
Mean = 4600 hours

Standard deviation = 250 hours

Find:

X such that the area under a normal distribution from negative infinity to z=(x-4600)/250 is 0.03 or 3%.

Diagram:



Theory:

Use z score

Z = (value – mean) / stdev

Assumptions:

Lightbulb lifetimes are approximately normally distributed

Solution:

Used ti-84 calculator

$$X = \text{invNorm}(0.03, 4800, 250) = 4129.80$$

Problem 5

Given:

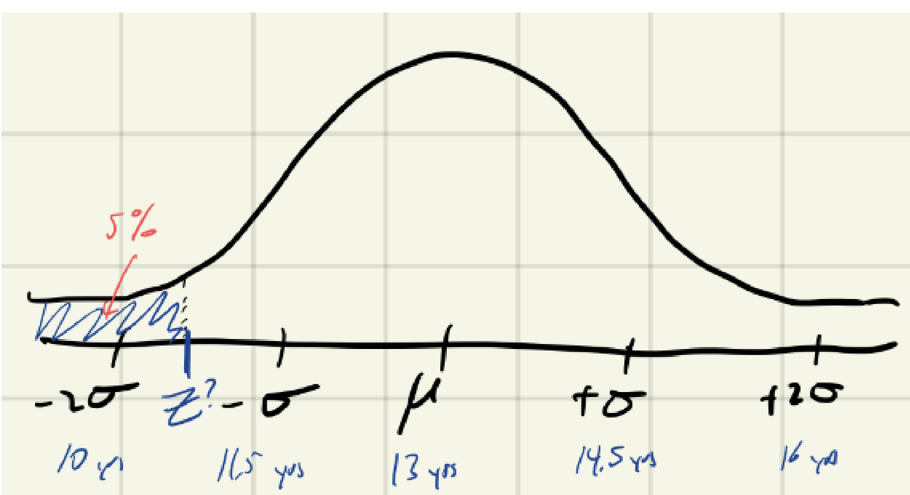
Mean = 13 years

Standard deviation = 1.5 years

Find:

The advertised scooter lifespan such that only 5% will die before the advertised lifespan given the mean and standard deviation data

Diagram:



Theory:

Use z score

Z = (value – mean) / stdev

Assumptions:

Lives of scooters are normally distributed

Solution:

Used ti-84 calculator

$$x = \mathrm{invNorm}(0.05, 13, 1.5) = 10.5327$$