

## Section 3.5b – Applying the Normal Distribution

MDM4U

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Height of cacti are normally distributed with a mean of 1.4 m and a standard deviation of 0.3 m.

$$X \sim N(1.4, 0.3^2)$$

1. 68% of the cacti are between...

68% will be within one standard deviation of the mean.

$$1.4 - 0.3 = 1.1$$

$$1.4 + 0.3 = 1.7$$

Therefore, 68% of cacti should be between 1.1 and 1.7 m tall.

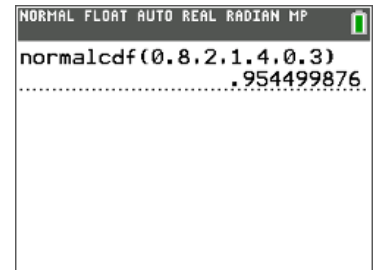
2. What percent of cacti are between 0.8 and 2m tall?

Based on the Empirical Rule, 95% of cacti should be between 0.8 and 2 m tall.

Using technology:

$$\text{Normalcdf}(\text{lower}=0.8, \text{upper} = 2.1, \mu = 1.4, \sigma = 0.3) = 0.954$$

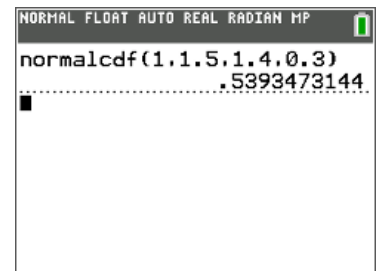
approximately 95.4% of cacti should be between 0.8 and 2 m tall.



3. What percent of cacti are between 1.0 and 1.5 meters tall?

$$\text{Normalcdf}(\text{lower}=1, \text{upper} = 1.5, \mu = 1.4, \sigma = 0.3) = 0.539$$

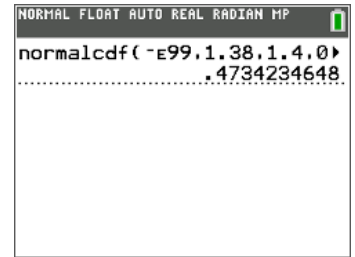
approximately 53.9% of cacti should be between 1 and 1.5 m tall.



4. What percent of cacti are less than 1.38 meters tall?

$$\text{Normalcdf}(\text{lower} = -E99, \text{upper} = 1.38, \mu = 1.4, \sigma = 0.3) = 0.473$$

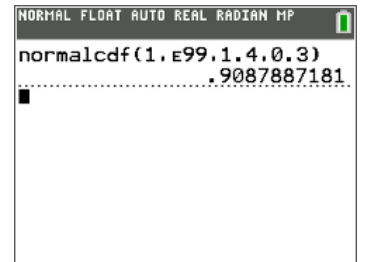
approximately 47.3% of cacti should be less than 1.38 m tall.



5. What percent of cacti are likely more than 1.0 meters tall?

$$\text{Normalcdf}(\text{lower} = 1, \text{upper} = E99, \mu = 1.4, \sigma = 0.3) = 0.9088$$

approximately 90.88% of cacti should be more than 1m tall.



6. Find the 90<sup>th</sup> percentile of cactus height...

$$\text{invnorm}(\text{area} = 0.9, \mu = 1.4, \sigma = 0.3) = 1.78$$

A 1.78 m tall cacti would be in the 90<sup>th</sup> percentile.

