The Normal Distribution

Ex. SAT-M has a mean of 500 and a standard deviation of 100

- What proportion of students score between 550 and 650?

Convert 550 and 650 to Z-scores

$$Z = \frac{X - \mu}{\sigma}$$

$$Z(550) = \frac{550 - 500}{100} = 0.5$$

$$Z(650) = \frac{650 - 500}{100} = 1.5$$

normalcdf(0.5, 1.5) = 0.242

lower : 0.5

upper : 1.5

μ 0

σ 1

- What proportion of students score over 550?

1572895

1570000

0.0047932

0.00479

1578895

1580000

$Z(550) = 0.5$

$P(Z > 0.5) =$

normalcdf(0.5, 9)

0.3085

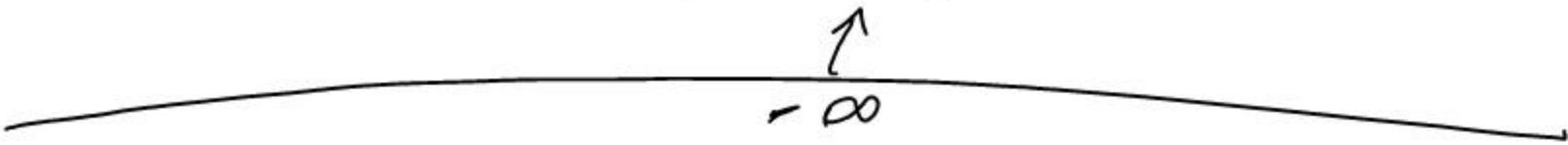
0.309

- What proportion of students score below 450?

$$z = \frac{450 - 500}{100} = -0.5$$

$$P(z < -0.5) = 0.309$$

normalcdf(−9, −0.5)



Ex. The average rutabaga weighs 24 ounces with a standard deviation of 3 ounces.

10% of rutabagas weigh more than p ounces. Find p.

$$z = \text{invnorm}(0.90) = 1.28 = \frac{x - 24}{3}$$

$$3.84 = x - 24$$

$$x = 27.8$$

$\boxed{p = 27.8 \text{ oz}}$

- 20% of rutabagas weigh less than q ounces. find q.

$$z = \text{invnorm}(0.20) = -0.842 = \frac{x-24}{3}$$

$$-2.524 = x - 24$$

$$x = 21.4$$

$q = 21.5$ oz

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p. 214 #5 $4.23 - 0.76$ $4.23 + 0.76$

(a) 3.47 kg to 4.99 kg

(b) $0.68 \times 180 = 122$ cats

(c) $z = \dfrac{3.1 - 4.23}{0.76} = -1.49$

$P(Z < -1.49) = \text{normalcdf}(-9, -1.49)$

$= 0.0681$

(d) $z(3) = \dfrac{3 - 4.23}{0.76} = -1.62$

$z(5.35) = \dfrac{5.35 - 4.23}{0.76} = 1.47$

$P(-1.62 < z < 1.47) = 0.877$

normalcdf$(-1.62, 1.47)$

87.7%

(e) $z = \text{invnorm}(0.95) = 1.64$

$1.64 = \dfrac{x - 4.23}{0.76}$

$x = 5.48$

$W = 5.48$ kg