

Normal Distribution

$$X \sim N(100, 16)$$

↑
normal distribution

↑ μ ↑ σ²

↑
random variable

Rutabegas (again)

X = weight of a rutabaga

$$X \sim N(32, 4)$$

normalcdf(-9, -2.5)

$$\text{Ex. } P(X \leq 27) = P(Z \leq -2.5) = 0.00621$$

$$Z = \frac{27 - 32}{2} = -2.5$$

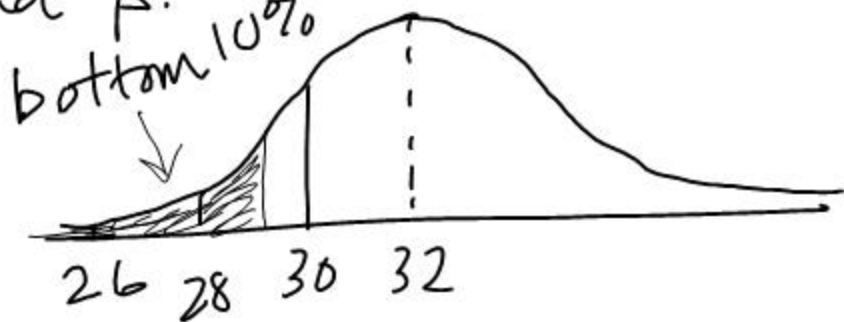
$$Z = \frac{X - \mu}{\sigma}$$

$$X \sim N(32, 4)$$

- 10% of rutabagas weigh less than p ounces. Find p .

$$Z = -1.28$$

↑
invnorm(0.10)



$$Z = -1.28 = \frac{p - 32}{2}$$

$$p = 29.4 \text{ oz}$$

- 20% of rutabagas weigh more than q ounces. Find q .

$$Z = \text{invnorm}(0.80) = 0.842 = \frac{q - 32}{2}$$

$$q = 33.7 \text{ oz}$$

EX. On a certain test with scores that are normally distributed, 27% of scores are over 110 and 15% of scores are below 70.

Find the mean and standard deviation.

$$P(X < 70) = 0.15 \Rightarrow z^* = \overset{\text{invnorm}(0.15)}{-1.04}$$

$$P(X > 110) = 0.27 \Rightarrow z = 0.613$$

$$\begin{cases} -1.04 = \frac{70 - \mu}{\sigma} \rightarrow \mu - 1.04\sigma = 70 \\ 0.613 = \frac{110 - \mu}{\sigma} \rightarrow \mu + 0.613\sigma = 110 \end{cases}$$

$$-1.653\sigma = -40$$

$$\boxed{\sigma = 24.2}$$

$$\boxed{\mu = 95.2}$$

The Binomial Distribution

- only 2 outcomes
- fixed number of trials
- fixed probability of success.

Ex. Roll 4 dice.

X = number of $\boxed{\cdot}$ that show

[2 outcomes: $\boxed{\cdot\cdot}$ OR not $\boxed{\cdot}$
of trials: 4
prob. of success: $p = 1/6$

Find $P(X=1) \rightarrow \boxed{\cdot}, \text{not}, \text{not}, \text{not}$
 $\rightarrow 4 \left(\frac{1}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} \right)$

$$= 0.386$$

$$P(X=1) = \binom{4}{1} \left(\frac{1}{6} \right)^1 \left(\frac{5}{6} \right)^3$$

$$P(X=2) = \binom{4}{2} \left(\frac{1}{6}\right)^2 \left(\frac{5}{6}\right)^2$$
$$= 0.116$$

$$X \sim B(4, \frac{1}{6})$$

↑ ↑ ← $p = \text{prob of success}$

$n = \# \text{ of trials}$