RECALL: Binomial random variable: 4 characteristics, calculating binomial probabilities.

RULE: $0! = 1$.

EX 5.6: $5! = 1 \times 2 \times 3 \times 4 \times 5 = 120$.

EX 5.7: Evaluate ${}_{10}C_4$.

EX 5.8: A famous survey stated that 70% of all university statistics students find their class more boring than watching paint dry. In a random sample of 11 stats students, what is the probability that:

(a) 10 find stats this boring?

(b) at least 10 find stats this boring?

(c) at most 10 find stats this boring?

Any easier ways to find binomial probabilities?

- Tables (p. 226–227). **WE WILL OMIT**.
- Minitab. Will be covered in labs.

Mean, Variance of binomial random variable (p. 228): If $X \sim \text{bin}(n, p)$,

$$\mu = np, \quad \sigma^2 = np(1-p) = npq$$

EX 5.8 (cont'd): Find the mean number of students that find stats more boring than watching paint dry, and the standard deviation.

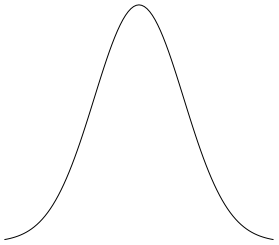
OMIT: Other Types of Distributions (Sect. 5–5)

The Normal Distribution

Text: Sect. 6–1, 6–2

Important distribution in statistics.

aka **The Bell Curve**:



• An example of a **continuous probability distribution** (p. 255) (recall continuous variable from Ch. 1).

Rules on continuous probability distributions (p. 250, 255):

1. Probability = area under curve. If our continuous random variable is X,

$$P(a \le X \le b) = A$$

BUT: $P(X = a) = 0$, since the area above a would be represented by a vertical line. Therefore,

$$\begin{aligned} P(a \le X \le b) &= P(a < X < b) \\ &= P(a \le X < b) = P(a < X \le b) \end{aligned}$$

2. Total area under curve = 1.

Properties of Normal Distribution (p. 250):

- Symmetric about μ (mean):

$$P(X > \mu) = P(X < \mu) = 0.5$$

- Spread controlled by σ^2 (variance).

Notation: If X is a normal random variable with mean $= \mu$ and variance $= \sigma^2$ (so standard deviation $= \sigma$), write

$$X \sim \mathrm{N}(\mu, \sigma)$$

Standard Normal Distribution: Normal distribution with $\mu = 0$, $\sigma = 1$ (p. 252).

- Symbolized by Z: $Z \sim \mathrm{N}(0, 1)$

Probabilities: Tables E–1, E–2 in text (p. 664–665).

- Table assumes standard normal distribution.

- In form $P(Z \leq \text{number})$ (cumulative area to left of Z).

EX 6.1: Suppose $Z \sim \mathrm{N}(0, 1)$. Find

(a) $P(Z < 1.23) =$

(b) $P(Z > -1.23) =$

(c) $P(1 < Z < 1.23) =$

EX 6.2: Find the z value that corresponds to a cumulative area to the left of 0.7486.

EX 6.3: Find the value of z_o such that $P(Z > z_o) = 0.14$.