

MORE PROBABILITY

Grandma's Cookie Jar



3 100's
5 20's
6 5's

Prob(2 100's + 1 20 OR 3 5's)

$$\frac{3C_2 \cdot 5C_1 + 6C_3}{14C_3}$$

$$= \frac{5}{52}$$

Mutually Exclusive Event

- no common items

- * AND vs. OR
- * AT Least/at most
- * Specific order
- * Binomial prob.

Select 2 from class

Prob(² jeans OR ² female)

$$\frac{5C_2 + 4C_2 - 4C_2}{7C_2}$$

4 F
3 M

5 jeans
2 other

$$= \frac{10 + 6 - 4}{21} = \frac{12}{21}$$

Mutually Inclusive Event
= share common items

4 f
 3 m
 4 jeans
 3 other

Select 3.

Prob (at least 1 jean wearer)
 0 jeans | 1¹ + 2² other OR j² + 1¹ other OR 3j
 3 other | .
 0.20

$$\begin{aligned}
 \text{Prob (at least one)} &= 1 - \text{Prob (none)} \\
 &= 1 - \frac{{}^3C_3}{{}^7C_3} \\
 &= 1 - \frac{1}{35} = \frac{34}{35}
 \end{aligned}$$

no jean
3 other

INDEPENDENT + DEPENDENT EVENTS

Dependent — the result of the 2nd event depends on the result of the 1st event

Independent — 2nd event is not influenced by the result of the 1st event

All must be true
Combinations
 1) Dependent events
 2) No order
 3) No replacement

If ANY are true:
Individual Prob. $\frac{2}{15} \cdot \frac{3}{14} \cdot \frac{1}{13}$
 1) Indep events
 OR
 2) Order
 OR
 3) Replacement

2 Five ²/₃ Extra
 4 Juicy Fruit 4 Spearmint

Prob (JF, put back, Five)

Pick 3.

Prob (J.F. then Extra then Juicy fruit)

$$\frac{\text{suc}}{\text{total}} = \frac{5}{14} \cdot \frac{3}{13} \cdot \frac{4}{12} = \frac{5}{182}$$

$$\frac{1}{5} \cdot \frac{1}{3} \cdot \frac{1}{4}$$

Odds = $\frac{5}{177}$

Odds (J.F. Extra, JF)

$$\frac{\text{suc}}{\text{fall}} = \frac{5}{9} \cdot \frac{3}{12} \cdot \frac{4}{8} = \frac{1}{12}$$

BAD!

Always do Prob. first—
 then find odds!

BINOMIAL PROBABILITY

$$(x+y)^5 = {}^5C_0 x^5 y^0 + {}^5C_1 x^4 y^1 + {}^5C_2 x^3 y^2 + \dots$$

Row 0

-	1	2	3	4	5	6
	1	3	6	10	15	21
		1	3	6	10	15
			1	3	6	10
				1	3	6
					1	3
						1

$s_0 \quad s_1 \quad s_2 \quad s_3 \quad s_4 \quad s_5$

Pascal's Δ

- 1) 2 possible outcomes
- 2) Independent Events (same chance every time)

Basketball Free Throws

Jade = free throw = 60%

Prob (at least 8)

What is the prob. she will hit 8 of her next 10?

$${}_{10}C_8 B^2 M^8$$
$${}_{10}C_8 (0.4)^2 (0.6)^8$$
$$\approx 0.12$$

$${}^{10}C_8 M^8 B^2 \text{ OR } {}^{10}C_9 M^9 B^1 \text{ OR } {}^{10}C_{10} M^{10} B^0$$

$${}^{10}C_8 (0.6)^8 (0.4)^2 + {}^{10}C_9 (0.6)^9 (0.4) + (0.6)^{10}$$

To find one exact event

binomialpdf

At least/at most

binomialcdf