15. Observation: Prizes are identical
→ order does not matter

$$n C r = \frac{n!}{r!(n-r)!}$$

$$n P r = \frac{n!}{(n-r)!}$$

order does matter

$$_{17}C_5 = \frac{17!}{5!\ (17-5)!}$$

$$= \frac{17!}{5!\ 12!}$$

$$= \frac{17 \cdot 16 \cdot 15 \cdot 14 \cdot 13 \cdot \cancel{12!}}{5!\ \cancel{12!}} = \frac{_{17}P_5}{5!}$$

$$= \frac{17 \cdot \overset{2}{\cancel{16}} \cdot \cancel{15} \cdot 14 \cdot 13}{\cancel{5} \cdot \cancel{4} \cdot \cancel{3} \cdot \cancel{2} \cdot 1}$$

$$= 17 \cdot 2 \cdot 14 \cdot 13 = \boxed{6,188}$$

16. How many ways can we choose jury of 12 people out of 30?

$$\underset{\text{people}}{30}\ C\ \underset{\text{jury}}{12} = \frac{30!}{12!\,(30-12)!}$$

$$= \frac{30!}{12!\ 18!}$$

$$= \frac{\cancel{30} \cdot 29 \cdot 28 \cdot 27 \cdot 26 \cdot 25 \cdot \cancel{24} \cdot 23 \cdot 22 \cdot 21 \cdot 20 \cdot 19 \cdot \cancel{18!}}{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot \cancel{6} \cdot \cancel{5} \cdot \cancel{4 \cdot 3 \cdot 2 \cdot 1}\ \cancel{18!}}$$

$= 86\ 493\ 225$ combinations people on jury

How do we pick a 12 person jury of all men?

$$\underset{\text{men}}{16}\, C_{\underset{\text{jury}}{12}} = \frac{16!}{12!\,(16-12)!}$$

$$= \frac{\cancel{16}^{\,2} \cdot \cancel{15}^{\,5} \cdot 14 \cdot 13}{\cancel{4 \cdot 3 \cdot 2 \cdot 1}\ \cancel{24}\ \cancel{3}}$$

$$= 2 \cdot 5 \cdot 14 \cdot 13$$

$= 1820$ combinations of men on jury

$$P(\text{all men on jury}) = \frac{1820}{86\ 493\ 225} = \frac{4}{190\ 095}$$

≈ 0.00002105

17

event	Value(x)	Probability P(x)	x P(x)
gold	\$3	$\frac{3}{34}$	$3 \cdot \frac{3}{34} = \frac{9}{34}$
silver	\$2	$\frac{10}{34}$	$2 \cdot \frac{10}{34} = \frac{20}{34}$
black	-\$1	$\frac{21}{34}$	$-1 \cdot \frac{21}{34} = -\frac{21}{34}$

$$\sum x P(x) = +\frac{8}{34}$$

$$\approx +\$0.235$$

Expected Value $\approx +\$0.24$

→ This game is worth playing, because you are expected to win 24 cents on average per play.

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18. Spent \$2,600 overall

26% of it on rent

.26

$$\$2600(.26) = \$676$$

19. 15.2, 18.8, 19.3, 19.7, 20.2, 21.8, 22.1, 29.4

(a) $\frac{15.2+18.8+19.3+19.7+20.2+21.8+22.1+29.4}{8} = 20.8125$

(b) Median: $\frac{19.7+20.2}{2}$

19.95

1. order values
2. eliminate from both ends

median : middle value

: mean of 2 middle values :

c) 5 number summary:

Max: 29.4

Q3: 21.95

Median: 19.95

Q1: 19.05

Min: 15.2

Q1: 25th Percentile

Larger than 25% of data values

median of lower half

15.2 18.8 19.3 19.7

2nd of 8

$\frac{18.8+19.3}{2} = 19.05$

Q3: 75th Percentile — Larger than 75% of data values.

median of upper half

20.2 21.8 22.1 29.4

6th of 8

$\frac{21.8+22.1}{2} = 21.95$

c.) Population Standard Deviation

$$\sigma = \sqrt{\frac{\sum (x-\mu)^2}{n}}$$

n-1 is for sample SD.

x	μ	$x-\mu$	$(x-\mu)^2$
15.2		-5.6125	31.50015625
18.8		-2.0125	4.05015625
19.3		-1.5125	2.28765625
19.7	20.8125	-1.1125	1.23765625
20.2		-0.6125	0.37515625
21.8		0.9875	0.97515625
22.1		1.2875	1.65765625
29.4		8.5875	73.74515625

$$\sum (x-\mu)^2 = 115.87825$$

$$\sigma \text{ population SD} = \sqrt{\frac{\sum (x-\mu)^2}{n}} = \sqrt{\frac{115.87825}{8}}$$

$$\approx 3.80574736$$

20. $\mu = 520$

$\sigma = 115$

$x = 720$

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{(720) - (520)}{115}$$

$$z = \frac{200}{115} \approx 1.74$$

a.) A student who scored 720 scored 1.74 standard deviations bettor than averase.

b.) $z = 1.5$

$x = ?$

$\mu = 520$

$\sigma = 115$

$$z = \frac{x - \mu}{\sigma}$$

$$\frac{1.5}{1} = \frac{x - 520}{115}$$

$$115(1.5) = x - 520$$

$$172.5 = x - 520$$

$$+520.0 \qquad +520$$

$$692.5 = x$$

692.5 is the SAT score 1.5 SD above the mean.

21. positive correlation

b/c positive slope

r close to $+1$

very close to a line with positive slope

We expect that when temperature increases, sales go up.

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2. Assume thickness of pizza is the same (no mention of height)

$A = \pi r^2$

$D_1 = 12 \rightarrow r_1 = 6$

$D_2 = 16 \rightarrow r_2 = 8$

$A_{12} = \pi r_1^2$

$A_{12} = \pi (6)^2$

$A_{12} = 36\pi$

requires 10 ounces

$A_{16} = \pi r_2^2$

$A_{16} = \pi (8)^2$

$A_{16} = 64\pi$

$$\frac{36\pi}{10\text{ oz}} = \frac{64\pi}{x}$$

$$36\pi x = 64\pi \cdot 10\text{ oz}$$

$$\frac{36\pi x}{36\pi} = \frac{640\cancel{\pi}\text{ oz}}{36\cancel{\pi}}$$

$$x = \frac{160}{9}\text{ oz}$$

$$x = 17.\overline{7}\text{ oz} \approx 17.8\text{ oz}$$