

1. place 3 boys and 3 girls in a row

$$\binom{6}{3} 3! 3! = 6!$$

b) no people of the same sex can sit together

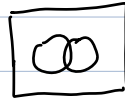
$$3! 3! \cdot 2$$

2. 8 friends, invite 5 of them (2 won't come together)

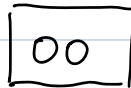
$$\binom{6}{5} + \binom{2}{1} \binom{6}{4} = \binom{8}{5} - \binom{6}{3} \binom{2}{2}$$

T(2.88) $P(A) = 0.6$, $P(B) = 0.3$

a) $P(AB) = 0.1$? \checkmark



b) $P(AB) \geq 0$



c) $P(AB) = 0.7$?



d) $P(AB) \leq 0.3$

T(3.23) 52 cards +15 J, Q +5 K, A -4 other

$$E[X] = 15 \left(\frac{2}{13}\right) + 5 \left(\frac{2}{13}\right) - 4 \left(\frac{9}{13}\right)$$

T(4.30) $f(y) = \begin{cases} 2y & 0 \leq y \leq 1 \\ 0 & \text{else} \end{cases}$

a) $E[Y] = \int_0^1 y \cdot 2y \, dy = 2 \left. \frac{y^3}{3} \right|_0^1 = \frac{2}{3}$

$$\begin{aligned} b) \quad \text{Var}(Y) &= E[Y^2] - (E[Y])^2 \\ &= \frac{1}{2} - \frac{4}{9} = \frac{1}{18} \end{aligned}$$

$$c) \quad X = 200Y - 60$$

$$E[X] = E[200Y - 60] = E[200Y] - 60 = 200 \left(\frac{2}{3}\right) - 60 = \frac{220}{3}$$

$$\text{Var}(X) = \text{Var}(200Y - 60) = \text{Var}(200Y) = 200^2 \text{Var}(Y) = 2240$$

$$T(7.42) \quad X, \quad E[X] = 14, \quad SD(X) = 2$$

$$a) \quad P(X_1 + \dots + X_{100} > 1450) = ?$$

$$\text{CLT}, \quad \frac{\frac{1}{100} \sum_{i=1}^{100} X_i - 14}{0.2} \approx N(0, 1)$$

$$\text{Var}\left(\frac{1}{100} \sum_{i=1}^{100} X_i\right) = \frac{100 \cdot 4}{100 \cdot 100} = \frac{1}{25} \quad SD(\cdot) = \frac{1}{5}$$

$$\begin{aligned} P(\bar{X} > 14.5) &= P\left(\frac{\bar{X} - 14}{0.2} > \frac{14.5 - 14}{0.2}\right) = P(Z > 2.5) = 1 - P(Z < 2.5) \\ &= 0.0062 \end{aligned}$$