Solution of Section 2.3, 2.4

- # Section 2.3:

- #1. 3!=6

- #2. $\frac{8!}{3!5!} = 56$.

- #3. The probability thta John will arrive right after Jim is 7!/8! (consider Jim and John as one arrival). Therefore, the answer is $1 - (7!/8!) = 0.875$.

  Another Solution: If Jim is the last person, John will not arrive after Jim. Therefore the remaining seven can arrive in 7! ways. If Jim is not the last person, the total number of possibilities in which John will not arrive right after Jim is $7 \times 6 \times 6!$. So, the answer is
$$\frac{7! + 7 \times 6 \times 6!}{8!} = 0.875.$$

- #11.
$$\frac{11!}{4!4!2!} = 34,650$$

- #15. Each girl and each boy has the same chance of occupying the 13th chair. So, the answer is 12/20=0.6. This can also be seen from
$$\frac{12 \times 19!}{20!} = \frac{12}{20} = 0.6.$$

- #16.
$$\frac{12!}{12^{12}} = 0.000054.$$

  ## Section 2.4

- # 1.
$$\binom{20}{6} = 38,760$$
- # 3.
$$\binom{20}{6}\binom{25}{6} = 6,864,396,000.$$
- # 11. The coefficient of $(2x)^3(-4y)^4$ in the expension of $(2x - 4y)^7$ is $\binom{7}{4}$. Thus, the coefficient of x^3y^4 in this expension is $2^3(-4)^4\binom{7}{4} = 71,680.$
- # 13. (a). $\binom{10}{5}/2^{10} = 0.246.$

  (b).
$$\sum_{i=5}^{10} \frac{\binom{10}{i}}{2^{10}} = 0.623.$$
- # 16.
$$\frac{\binom{50}{5}\binom{150}{45}}{\binom{200}{50}}.$$
- #21. The desired probability is
$$\frac{{}_{12}C_6 \cdot {}_{12}C_6}{{}_{24}C_{12}} = 0.3175.$$