2019–20 **MATH117 Mathematics for Architects – Homework 5 Solutions** N. Course

21. (a). ${}_8P_5 = 6720$
    (b). ${}_8C_5 = 56$
    (c). $2 \cdot {}_6C_4 = 30$
22. (a). ${}_{13}C_6 = 1716$
    (b). ${}_{12}C_5 = 792$
    (c). 0
23. The probability of the former is $\frac{{}_{12}C_5}{{}_{52}C_5} \approx 0.0003047$. The probability of the latter is $\frac{{}_{26}C_{13}}{{}_{52}C_{13}} \approx 0.00001638$. Hence the former has a higher probability of occuring.
24. (a). Let $A = \{2,4,6\}$ and $B = \{3,4,5,6\}$. Then $A \cap B = \{4,6\}$ and $P(A \cap B) = P(4) + P(6) = \frac{1}{6} + \frac{3}{12} = \frac{5}{12}$.
    (b). Let D = "a student likes their Basic Design teacher" and M = "a student likes their Mathematics teacher". Then $P(D) = 0.63$, $P(M) = 0.34$ and $P(D \cap M) = 0.27$. It follows that

$$P(D \cup M) = P(D) + P(M) - P(D \cap M) = 0.63 + 0.34 - 0.27 = 0.7.$$

25. (a). The probability of getting zero diamonds is $\frac{{}_{39}C_5}{{}_{52}C_5} \approx 0.2215$. Therefore the probability of getting at least one diamond is approximately $1 - 0.2215 = .7785$.
    (b). The probability of getting all red cards is $\frac{{}_{26}C_{13}}{{}_{52}C_{13}} \approx 0.00001638$. Hence the probability of getting at least one black card is approximately $1 - 0.00001638 = 0,99998362$.