

Question 2:

Marks: 2+5

- a) What is the probability that a poker hand of 5 cards contain exactly 2 aces?

Answer:

Using combinations: $(4 \text{ C } 2) * (48 \text{ C } 3) / (52 \text{ C } 5) = 29.95\%$

- b) A pair of dice is rolled 180 times. By using the normal approximation to binomial distribution, find the probability that a total of 7 occurs at least 25 times.

Answer: -

$$b(x;n,p) = b(x;180,1/6) = \binom{180}{x} \left(\frac{1}{6}\right)^x \left(\frac{5}{6}\right)^{180-x}$$

with mean $= 180 \times 1/6 = 30$ and variance $\sigma^2 = 180 \times 1/6 \times 5/6 = 24.8$

$$z = \frac{X - np}{\sqrt{npq}} = \frac{24.5 - 30}{5} = -1.1$$

$$P(X > 25) = P(X > 24.5) = P(Z > -1.1)$$

$$= 1 - p(Z < -1.1) = 1 - 0.135 = 0.864 \text{ Answer}$$

Elaborate it yourself: