Sample Paper 4: Paper 2

Question 8 (25 marks)

Question 8 (a)

$P(4) = \frac{1}{6}$

$P(\text{Not } 4) = \frac{5}{6}$

$$P = 1 - \{{}^{20}C_0(\tfrac{1}{6})^0(\tfrac{5}{6})^{20} + {}^{20}C_1(\tfrac{1}{6})^1(\tfrac{5}{6})^{19} + {}^{20}C_2(\tfrac{1}{6})^2(\tfrac{5}{6})^{18} + {}^{20}C_3(\tfrac{1}{6})^3(\tfrac{5}{6})^{17} + {}^{20}C_4(\tfrac{1}{6})^4(\tfrac{5}{6})^{16} + {}^{20}C_5(\tfrac{1}{6})^5(\tfrac{5}{6})^{15}\}$$

$$= 1 - 0.898$$

$$= 0.102$$

$$= 10.2\%$$

Question 8 (b)

A probability of 10.2% means that a fair die will give six or more 4s 10.2% of the time in 20 throws of a die. So there is nothing unusual about the die used in the casino. If the probability of at least six 4s when a fair die was tossed 20 times was less that 5% then this probability is so small that it hasn't happened by chance and so the die is biased.