Normal Approximations to the Binomial Distribution (OCR Exam Board Only)

1. For a normal distribution, state the amount of area that must lie within
   a. 1 standard deviation of the mean [1]
   b. 2 standard deviations of the mean [1]
   c. 3 standard deviations of the mean. [1]

2. A discrete random variable X has the distribution $B(200, 0.2)$.
   a. Show that this distribution can be modelled approximately by a normal distribution, stating the mean and variance of this normal distribution. [4]
   b. Using this approximation, estimate the symmetrical interval (with the mean at its centre) in which $\frac{2}{3}$ of the total probability in the original model lies. [3]

3. A fair dice is thrown 90 times and it is classed as a "win" each time a six is thrown.
   a. State the distribution that can be used to model this game (including the values of any parameters) and the make clear the assumptions required for this model to be valid. [3]
   b. State the conditions for the distribution identified in (a) to be approximated by a normal distribution and show that these conditions are fulfilled. State the values of the parameters used in the normal approximation to the distribution in (a). [3]
   c. Using the normal approximation identified in (b), find the value of k such that the probability that the number of sixes rolled is greater than k is equal to 0.025. [3]