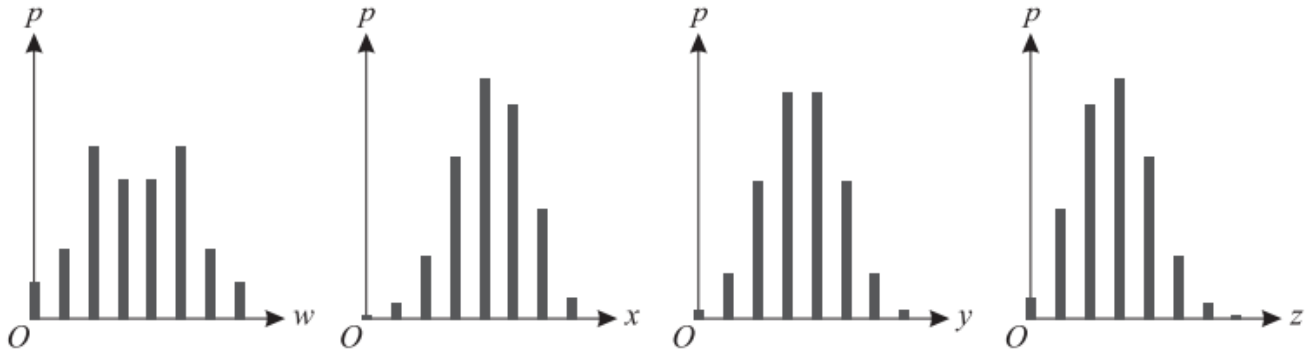
Binomial Distribution (From OCR 4732)

Q1, (Jan 2007, Q4)

Each of the variables W, X, Y and Z takes eight integer values only. The probability distributions are illustrated in the following diagrams.



(i) For which one or more of these variables is

(a) the mean equal to the median, [1]

(b) the mean greater than the median? [1]

(ii) Give a reason why **none** of these diagrams could represent a geometric distribution. [1]

(iii) Which one of these diagrams could **not** represent a binomial distribution? Explain your answer briefly. [2]

Q2, (Jan 2007, Q9)

A variable X has the distribution B(11, p).

(i) Given that $p = \frac{3}{4}$, find $P(X = 5)$. [2]

(ii) Given that $P(X = 0) = 0.05$, find p. [4]

(iii) Given that $\text{Var}(X) = 1.76$, find the two possible values of p. [5]

Q3, (Jun 2008, Q3)

(i) A random variable X has the distribution B(8, 0.55). Find

(a) $P(X < 7)$, [1]

(b) $P(X = 5)$, [2]

(c) $P(3 \leqslant X < 6)$. [3]

(ii) A random variable Y has the distribution $B\left(10, \frac{5}{12}\right)$. Find

(a) $P(Y = 2)$, [2]

(b) $\text{Var}(Y)$. [1]

Q4, (Jun 2009, Q1)

20% of packets of a certain kind of cereal contain a free gift. Jane buys one packet a week for 8 weeks. The number of free gifts that Jane receives is denoted by X. Assuming that Jane's 8 packets can be regarded as a random sample, find

(i) $P(X = 3)$, **[3]**

(ii) $P(X \geqslant 3)$, **[2]**

(iii) $E(X)$. **[2]**

Q5, (Jun 2011, Q3)

(i) A random variable, X, has the distribution $B(12, 0.85)$. Find

(a) $P(X > 10)$, **[2]**

(b) $P(X = 10)$, **[2]**

(c) $\text{Var}(X)$. **[2]**

(ii) A random variable, Y, has the distribution $B(2, \frac{1}{4})$. Two independent values of Y are found. Find the probability that the sum of these two values is 1. **[4]**

Q6, (Jan 2013, Q5)

A random variable X has the distribution $B(5, \frac{1}{4})$.

(i) Find

(a) $E(X)$, **[1]**

(b) $P(X = 2)$. **[2]**

(ii) Two values of X are chosen at random. Find the probability that their sum is less than 2. **[4]**

(iii) 10 values of X are chosen at random. Use an appropriate formula to find the probability that exactly 3 of these values are 2s. **[3]**
