

MA20104 Probability and Statistics

Answers Problem Set 2

- $f(x) = \begin{cases} \frac{1}{10} & \text{for } x = 0, 1, \dots, 9 \\ 0 & \text{elsewhere} \end{cases}$
- (a) $P(X = k) = \frac{\binom{6}{k} \binom{4}{n-k}}{\binom{10}{n}}, 0 \leq k \leq 6$
(b) $P(X = k) = \binom{n}{k} \left(\frac{3}{5}\right)^k \left(\frac{2}{5}\right)^{n-k}, 0 \leq k \leq 6$
- (a) 0.3
(b) 0.3
(c) 0.55
(d) $\frac{2}{9}$
(e) $\frac{5}{11}$
- (a) $(1-p)^4$
(b) $(1-p)^4 - (1-p)^8 + (1-p)^{10}$
(c) $(1-p)^3 - (1-p)^6 + (1-p)^7 - (1-p)^{11}$
- $P(Y = x) = \begin{cases} p(1-p)^x & \text{for } 0, 1, \dots, M-1 \\ (1-p)^M & \text{for } x = M \end{cases}$
- (a) $P(Y \leq y) = \frac{\binom{y}{r}}{\binom{n}{r}}, y = n, n+1, \dots, r$
(b) $P(Z \geq z) = \frac{\binom{r+1-z}{r}}{\binom{n}{r}}, z = 1, 2, \dots, r-n+1$
- (a) $\frac{p_2}{p_1+p_2-p_1p_2}$
(b) $\frac{p_1p_2}{p_1+p_2-p_1p_2}$
(c) geometric with parameter $p_1 + p_2 - p_1p_2$
(d) $\frac{p_1p_2}{p_1-p_2} [(1-p_2)^{z+1} - (1-p_1)^{z+1}], z = 0, 1, \dots$
- (a) $\frac{(2r)!}{x_1! \dots x_r! r^{2r}}$ where x_i are nonnegative integers whose sum is equal to $2r$
(b) $\frac{(2r)!}{2^r r^{2r}}$
- $\frac{53}{8} e^{-5/2}$
- $\frac{17}{2} e^{-3}$