7. The random variable $X \sim \text{B}(140, p)$

(a) Find the value of p **and** the value of σ^2 such that X can be approximated by the normal distribution $\text{N}(42, \sigma^2)$

(3)

The random variable $W \sim \text{B}\left(n, \frac{1}{3}\right)$

(b) (i) Write down an expression for $\text{P}(W = 2)$ in terms of n

(ii) Find the value of n such that $\text{P}(W = 2) = \text{P}(W = 3)$

(4)

The random variable $Y \sim \text{Po}(\lambda)$

(c) Find, in terms of r, an expression for λ such that

$$\text{P}(Y = r) = (r + 2) \times \text{P}(Y = r + 2)$$

(3)

(Total for Question 7 is 10 marks)

TOTAL FOR PAPER IS 75 MARKS