

Unit 5 *Binomial Distribution*

Text Answers

5.1 Finding the Distribution

1. (a) 0.329 (b) 0.351 (c) 0.912
2. (a) 0.000138 (b) 0.0282 (c) 0.953
3. 1 ($pP(R = 1) = 0.422$)
4. 0.230
5. 0.984
6. $\binom{8}{2} = \frac{8!}{2!6!} = 28$ and $\binom{8}{6} = \frac{8!}{6!2!} = 28$
7. (a) (i) 0.5289 (ii) 0.3158
(b) 0.9699
8. (a) No; more than 2 outcomes (b) Yes
(c) No; probability changes each time
9. (a) 4.8, 0.98
(b) $X \sim B(6, 0.8)$; $p(X \geq 5) = p(x = 5) + p(x = 6)$
 $= {}^6C_5 (0.8)^5 (0.2) + (0.8)^6$
 $= 0.655$ to 3 d.p.
(c) 0.737 (d) 0.388

5.2 The Mean and Variance of the Binomial Distribution

1. 1. 0.263
2. 7
3. $\frac{2}{3}$
4. 0.51, 38
5. (a) B (20, 0.2) (b) 4; 3.2 (c) 0.0026
7. B (18, 0.8), mean value = $18 \times 0.8 = 14.4$, but
 $p(x = 15) = 0.2297$
and $p(x = 14) = 0.2153$;
So the most likely value is 15.

Unit 5 *Binomial Distribution*

Text Answers

5.2

8. (a) $(0.5)^{10} = 0.000977$
- (b) In the first 10 steps, there need to be 9 in the dock direction and one in the reverse direction; this has

$$\begin{aligned}\text{probability} &= {}^{10}C_9 (0.5)^9 (0.5) \\ &= 10 \times (0.5)^{10}\end{aligned}$$

The next 2 steps must both be in the dock direction, with

$$\text{probability} = (0.5)^2$$

Combining these two probabilities,

$$\begin{aligned}p(\text{fall into dock on 12}^{\text{th}} \text{ step}) &= (10 \times (0.5)^{10}) \times (0.5)^2 \\ &= 10 \times (0.5)^{12} \\ &\approx 0.00244\end{aligned}$$

(c) 0.377

9. 0.2051
10. $P(\text{Don scores at least 3}) = 0.3222$
 $P(\text{Yvette scores at least 3}) = 0.3174$