Author: Tharaniya Rasakulasingham

This step-by-step solution guide has been created by **Tharaniya Rasakulasingham** for educational purposes. While we have made every effort to ensure the accuracy of the information presented, it is possible that there may be errors or omissions. We encourage users to critically evaluate and verify the content. BF Maths and the author cannot be held responsible for any errors or inaccuracies in this guide.

If you find any mistakes or have any suggestions for improvements, please contact us at bfmathshello@gmail.com. Your feedback is invaluable in helping us maintain the quality and accuracy of our resources. Please specify *which exercise* and *which question* in the email.

Thank you for using BF Maths for your maths revision!

6.3: Cumulative Probabilities

$X \sim B(12, 0.3)$

1) a) $P(X \leq 2) = 0.2528$

b) $P(X < 6) = P(X \leq 5) = 0.8822$

c) $P(X \geq 7) = 1 - P(X \leq 6) = 0.0386$

2) a) $P(Y \leq 7) = 0.7869$ $\quad Y \sim B(15, 0.4)$

b) $P(Y > 9) = 1 - P(Y \leq 9) = 0.0338$

c) $P(1 < Y \leq 6) = P(Y \leq 6) - P(Y \leq 1) = 0.6046$

3) a) $P(T < 25) = P(T \leq 24) = 0.8632$ $\quad T \sim B(35, 0.61)$

b) $P(T \geq 28) = 1 - P(T \leq 27) = 0.0138$

c) $P(15 \leq T < 30) = P(T \leq 29) - P(T \leq 14) = 0.9890$

4) $X \sim B(30, 0.25)$

a) $P(X < 10) = P(X \leq 9) = 0.8034$

b) $P(X \geq 14) = 1 - P(X \leq 13) = 0.0082$

c) $P(10 \leq X \leq 14) = P(X \leq 14) - P(X \leq 9) = 0.1938$

5) $X \sim B(25, 0.46)$

a) $P(X = 8) = 0.0612$

b) $P(X > 12) = 1 - P(X \leq 12) = 0.3429$

c) $X \sim B(6, 0.3429)$

$P(X \geq 4) \rightarrow 1 - P(X \leq 3) = 0.1098$

6) She has worked out the probability of greater than 8 and not included the probability of 8 itself.

b) Correct Probability: $P(X \geq 4) = 1 - P(X \leq 3) = 0.2131$

7) a) $X \sim B(40, 0.2)$

b) $P(X \leq k) < 0.09 \rightarrow P(X \leq 4) = 0.0759$ $\quad k = 4$

$P(X \leq 5) = 0.1613$

because $P(X \leq 4) = 0.0759$

$0.0759 < 0.09$

c) $P(X > m) < 0.05$

$P(X \leq k) = 1 - 0.05 = 0.95$

$P(X \leq 11) = 0.9125 \rightarrow P(X > 11) = 1 - 0.9125 = 0.0875$

$P(X \leq 12) = 0.9568 \rightarrow P(X > 12) = 1 - 0.9568$

$= 0.0432$

$P(X > m) < 0.05$

since $P(X > 12) = 0.0432$

this is less than 0.05 so $m = 12$

d) $P(4 \leq X \leq 12) = P(X \leq 12) - P(X \leq 3)$

$= 0.95675 - 0.02846$

$= 0.9283$

8) a) i) $P(X = 8) = 0.1181$ $\quad X \sim B(15, 0.4)$

ii) $P(X > 10) = 1 - P(X \leq 10) = 0.0093$

b) She has worked out the probability of greater than 8 and not included the probability of 8 itself.

Correct Probability: $P(X \geq 8)$

$= 1 - P(X \leq 7) = 0.2131$