Each football game begins with a coin toss in the presence of the captains from the two opposing teams. (The winner of the toss has the choice of goals or of kicking or receiving the first kickoff.) A particular football team is scheduled to play 10 games this season. Let x = the number of coin tosses that the team captain wins during the season. Using the appropriate table in your textbook, solve for $P(4 \le x \le 8)$.

A. 0.817

B. 0.171

C. 0.377

D. 0.246

Solution

The probability of winning n out of 10 is the probability of winning n times the probability of losing 10-n times the number of ways this can happen which is 10!/(n!*(10-n)!). So the probability of getting exactly n wins assuming a fair coin is

$$P_n = \left(\left(\frac{1}{2}\right)^n\right) * \left(\left(1-\frac{1}{2}\right)^{10-n}\right) * \frac{10!}{n! * (10-n)!}$$

where ! assumes you know the notation n! is n factorial (example 3!=3*2*1).

The desired probability is then obtained by adding P_n values for n = 4 through 8. The answer is $\frac{837}{1024}$ or approximately 0.817.

Answer: A. 0.817.