

Question 4

The continuous random variable, X , has a probability density function given by

$$f(x) = \begin{cases} \frac{1}{4} \cos\left(\frac{x}{2}\right) & 3\pi \leq x \leq 5\pi \\ 0 & \text{elsewhere} \end{cases}$$

The value of a such that $\Pr(X < a) = \frac{\sqrt{3} + 2}{4}$ is

- A. $\frac{19\pi}{6}$
- B. $\frac{14\pi}{3}$
- C. $\frac{10\pi}{3}$
- D. $\frac{29\pi}{6}$
- E. $\frac{17\pi}{3}$

Question 5

Consider the discrete probability distribution with random variable X shown in the table below.

x	-1	0	b	$2b$	4
$\Pr(X = x)$	a	b	b	$2b$	0.2

The smallest and largest possible values of $E(X)$ are respectively

- A. -0.8 and 1
- B. -0.8 and 1.6
- C. 0 and 2.4
- D. 0.2125 and 1
- E. 0 and 1

Question 6

The binomial random variable, X , has $E(X) = 2$ and $\text{Var}(X) = \frac{4}{3}$.
 $\Pr(X = 1)$ is equal to

- A. $\left(\frac{1}{3}\right)^6$
- B. $\left(\frac{2}{3}\right)^6$
- C. $\frac{1}{3} \times \left(\frac{2}{3}\right)^2$
- D. $6 \times \frac{1}{3} \times \left(\frac{2}{3}\right)^5$
- E. $6 \times \frac{2}{3} \times \left(\frac{1}{3}\right)^5$

Question 7

Consider the following discrete probability distribution for the random variable X .

x	1	2	3	4	5
$\Pr(X = x)$	p	$2p$	$3p$	$4p$	$5p$

The mean of this distribution is

- A. 2
- B. 3
- C. $\frac{7}{2}$
- D. $\frac{11}{3}$
- E. 4

Question 8

If X is a random variable such that $\Pr(X > 5) = a$ and $\Pr(X > 8) = b$, then $\Pr(X < 5 | X < 8)$ is

- A. $\frac{a}{b}$
- B. $\frac{a-b}{1-b}$
- C. $\frac{1-b}{1-a}$
- D. $\frac{ab}{1-b}$
- E. $\frac{a-1}{b-1}$

Question 9

A soccer player is practising her goal kicking. She has a probability of $\frac{3}{5}$ of scoring a goal with each attempt. She has 15 attempts.

The probability that the number of goals she scores is less than 7 is closest to

- A. 0.0612
- B. 0.0950
- C. 0.1181
- D. 0.2131
- E. 0.7869

Question 10

John and Rebecca are playing darts. The result of each of their throws is independent of the result of any other throw. The probability that John hits the bullseye with a single throw is $\frac{1}{4}$. The probability that Rebecca hits the bullseye with a single throw is $\frac{1}{2}$. John has four throws and Rebecca has two throws.

The ratio of the probability of Rebecca hitting the bullseye at least once to the probability of John hitting the bullseye at least once is

- A. 1:1
- B. 32:27
- C. 64:85
- D. 2:1
- E. 192:175