One piece of fruit is chosen randomly from a box containing 3 apples, 4 bananas, and 5 cherries. Each piece of fruit is equally likely. The random variables X and Y are defined as follows:

$$\begin{aligned} X(apple) &= 0 & Y(apple) &= 1 \\ X(banana) &= 1 & Y(banana) &= 1 \\ X(cherry) &= -1 & Y(cherry) &= 0 \end{aligned}$$

What is the value of the CDF difference $F_X(\frac{\sqrt{2}}{2}) - F_Y(1)$?

(a) $-1/3$

(b) $1/3$

(c) $1/4$

(d) $-1/4$

(e) $5/12$

(f) $-5/12$

(g) 0

(h) 1

(i) -1

(j) $7/12$

(k) $3/4$

(l) $2/3$

(m) None of these

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$$\begin{aligned} X(apple) &= 0 & Y(apple) &= 1 \\ X(banana) &= 1 & Y(banana) &= 1 \\ X(cherry) &= -1 & Y(cherry) &= 0 \end{aligned}$$

What is the probability that $(X^2 - 2XY)^2$ is positive?

(a) 3/4

(b) 1/4

(c) 1/3

(d) 2/3

(e) 5/12

(f) 7/12

(g) 0

(h) 1

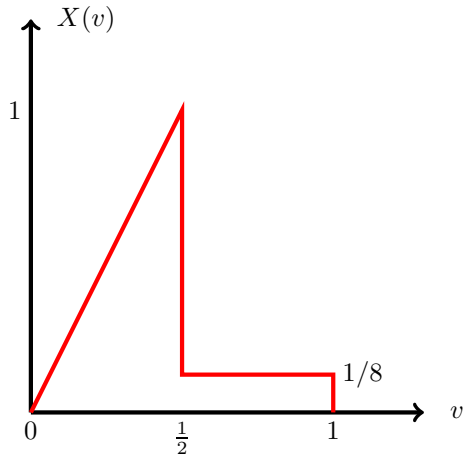
(i) 1/2

(j) 1/12

(k) 3/8

(l) None of these

An experiment has sample space $S = [0, 1]$ and $P([a, b]) = b - a$ whenever $0 \leq a \leq b \leq 1$. A random variable X on S is defined as shown in the graph below. What is the CDF value $F_X(1/3)$?



(a) 2/3

(b) 1/6

(c) 1/3

(d) 1/2

(e) 7/24

(f) 11/24

(g) 1/8

(h) 1/4

(i) 3/8

(j) 5/6

(k) 5/24

(l) None of these