Question One: If $P(B) = 0.25$ and $P(A - B) = 0.25$ then we get $P(A|\Omega) - P(B)P(A|B) =$

(A) 0.25 B) 0.5 C) 0 D) 0.2 E) None

Question Two: For some disjoint and independent events A, B with $P(A) = 0.1$ we have $P(B) =$

A) 1 B) 0.3 (C) 0 D) 0.4 E) None

Question Three: Let X be a discrete random variable with $E(X) = \bar{X}$. If $P(X = \bar{X}) = 0.8$, then $P(X \neq \bar{X}) =$

A) 0 B) 0.8 C) 0.75 (D) 0.2 E) None

Question Four: For some independent events A, B with $P(A)P(B) = 0.2$ then we have $P(\bar{A} \cup \bar{B}) =$

A) 0.9 (B) 0.8 C) 0.7 D) 0.6 E) None

Question Five: Let A, B be two events with equal probability and $P(\bar{A} \cap B) + P(\bar{B} \cap A) = 1.6$, then $P(A) =$

A) 0.2 B) 0.1 C) 0.8 D) 0.3 E) None

Question Six: Let X be a discrete random variable with $R_X = \{0, 1, -1\}$ then we have $E(X^3) + E(X^4) - 2E(X^6) =$

A) 0 B) 1 C) 2 D) -1 E) None

Question Seven: Let f be a continuous strictly increasing function on $\mathbb{R}$. Then we have $\int_{-\infty}^{\infty} f(x)(\delta(x+1)-\delta(x-1))\,dx$ is

A) zero B) negative C) positive D) equal to one E) None

Question Eight: For the joint PDF $f(x,y) = 2\,x^{\,b}$ when $0<x<1$, $0<y<1$ and zero otherwise, the positive constant b equals

A) 2 B) 0.5 C) 0 D) 1 E) None

Question Nine: For the joint PDF $f(x,y) = 0.5$ when $0<x<1$, $0<y<2$ and zero otherwise, we have $P(0<Y<0.2) =$

A) 0.1 B) 0 C) 0.25 D) 0.5 E) None

Question Ten: A discrete random variable X with PDF

$P(X=x) = a(\ \delta(x)+\delta(x-1)+\delta(x+1)+\delta(x-2)\ )$; where $a>0$ is a constant, then we have $a + P(X=0)+P(X=1)+P(X=-1) =$

A) 0 B) 1 C) 0.75 D) 0.5 E) None

Question Eleven (✓,Ⓧ): For continuous random variables X,Y we always have $Cov(-X-1,-Y) \geq -\sigma_X\sigma_Y$ ✗

Question Twelve (✓,Ⓧ): For continuous random variable X with CDF $F(x) = 1-e^{-\sqrt{x}}$ when $x>0$ and zero otherwise; then the PDF is $f(x) = e^{-\sqrt{x}}/\sqrt{x}$ ✗

Question Thirteen (Ⓥ,X): If $x \in (-1,1)$; then $u(-x-1)+\delta(x-2)=1$ ✓

Question Fourteen (✓,Ⓧ) For some random variable X , if the CDF $F(x)=x^3, x\in(0,1)$, then $P(X\in(0,0.1))+P(X=0.5)=0.01$ ✗

Question Fifteen (✓,Ⓧ): Given the CDF

$$F(x)=\begin{cases}0 & x<1\\ 0.25 & 1\leq x<2\\ 1 & 2\leq x\end{cases}$$ ✓

We have $P(X=2)=3/4$