Institute of Actuaries of India

ACET August 2025 Indicative Solution

Mathematics

1	B	1 real root 0, 2 complex roots
2	B	
3	A	3*4-2*5=2
4	C	C*A since (3x4)*(3x2) can't be determined
5	D	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ $f'(x) = 3x^2 - 2$ $x_0 = 2$ $f(2) = 2^3 - 2(2) - 5 = 8 - 4 - 5 = -1$ $f'(2) = 3(2)^2 - 2 = 12 - 2 = 10$ $x_1 = 2 - \frac{-1}{10} = 2 + 0.1 = 2.1000$ $f(2.1000) = (2.1000)^3 - 2(2.1000) - 5 = 9.2610 - 4.2000 - 5 = 0.0610$ $f'(2.1000) = 3(2.1000)^2 - 2 = 13.2300 - 2 = 11.2300$ $x_2 = 2.1000 - \frac{0.0610}{11.2300} \approx 2.1000 - 0.0054 = 2.0946$
6	A	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$ $f(x) = \ln\left(\sqrt{x^2 + \sin(x)}\right) - 2 = \frac{1}{2}\ln(x^2 + \sin(x)) - 2$ $f'(x) = \frac{1}{2} \cdot \frac{2x + \cos(x)}{x^2 + \sin(x)} = \frac{x + \frac{1}{2}\cos(x)}{x^2 + \sin(x)}$ $f(1) \approx \frac{1}{2}(0.6116) - 2 = 0.3058 - 2 = -1.6942$ $f'(1) = \frac{1 + 0.27015}{1 + 0.84147} = \frac{1.27015}{1.84147} \approx 0.6897$ $x_1 = x_0 - \frac{f(x_0)}{f'(x_0)} = 1 - \frac{-1.6942}{0.6897} \approx 1 + 2.45679 = 3.45679$
7	B	
8	A	
9	A	
10	A	$1 + \omega + \omega^2 = 0 \Rightarrow 1 = -(\omega + \omega^2)$ $\omega + \omega^2 = -1 \Rightarrow 1 - \omega - \omega^2 = 1 - (-1) = 2$ $(1 - \omega - \omega^2)^5 = (2)^5 = 32$
11	B	
12	D	
13	A	
14	C	
15	C	
16	D	
17	C	
18	D	

19	A	$\frac{dy}{dx} = \frac{v \cdot \frac{du}{dx} - u \cdot \frac{dv}{dx}}{v^2}$ $\frac{dy}{dx} = \frac{\cos x \cdot e^x - e^x \cdot (-\sin x)}{\cos^2 x}$ $\frac{dy}{dx} = \frac{e^x \cos x + e^x \sin x}{\cos^2 x}$ $\frac{dy}{dx} = \frac{e^x(\cos x + \sin x)}{\cos^2 x}$
20	C	

Statistics

21	D	$P((A\cup B)\cap C^c) = P(A\cup B) - P((A\cup B)\cap C)$ $P(A\cup B) = P(A) + P(B) - P(A\cap B) = 0.5 + 0.6 - 0.2 = 0.9$ $P((A\cup B)\cap C) = P(A\cap C) + P(B\cap C) - P(A\cap B\cap C) = 0.15 + 0.1 - 0.05 = 0.2$ $P((A\cup B)\cap C^c) = P(A\cup B) - P((A\cup B)\cap C) = 0.9 - 0.2 = 0.7$
22	D	
23	D	
24	B	
25	A	
26	D	
27	D	
28	B	
29	B	
30	A	
31	B	
32	A	$S^2_{\text{unbiased}} = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2$ and $E[S^2_{\text{unbiased}}] = \sigma^2$ $S^2 = \frac{1}{n}\sum_{i=1}^{n}(X_i - \bar{X})^2 = \left(\frac{n-1}{n}\right) S^2_{\text{unbiased}}$ $E[S^2] = E\left[\left(\frac{n-1}{n}\right) S^2_{\text{unbiased}}\right] = \left(\frac{n-1}{n}\right) E\left[S^2_{\text{unbiased}}\right]$ $E[S^2] = \left(\frac{n-1}{n}\right)\sigma^2$
33	D	$E(XY) = 1\cdot 1\cdot q + 1\cdot 2\cdot 0.2 + 3\cdot 1\cdot (0.4 - q) + 3\cdot 2\cdot 0.4$ $= q + 0.4 + 1.2 - 3q + 2.4 = 4.0 - 2q$ $E(X) = 1(q + 0.2) + 3(0.8 - q) = q + 0.2 + 2.4 - 3q = -2q + 2.6$ $E(Y) = 1(0.4) + 2(0.6) = 0.4 + 1.2 = 1.6$ $\text{Cov}(X,Y) = E(XY) - E(X)E(Y) = (4.0 - 2q) - (2.6 - 2q)(1.6)$ $= 4.0 - 2q - [4.16 - 3.2q] = 4.0 - 2q - 4.16 + 3.2q = -0.16 + 1.2q$

		Set this equal to **0** to get correlation = 0: $$-0.16 + 1.2q = 0 \Rightarrow q = \frac{0.16}{1.2} = \frac{16}{120} = \frac{2}{15} \approx 0.133$$
34	D	
35	B	
36	B	
37	B	
38	A	
39	A	
40	A	

Data Interpretation

41	B
42	B
43	A
44	A
45	B
46	C
47	B
48	C
49	C
50	D
51	A

English

52	B
53	B
54	B
55	C
56	B
57	A
58	D
59	B
60	B
61	C
62	C

Logical Reasoning

63	B
64	A
65	A
66	B
67	D
68	A
69	D
70	D

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