<table>
<tr><td>1</td><td>d</td></tr>
<tr><td>2</td><td>c</td></tr>
<tr><td>3</td><td>b</td></tr>
<tr><td>4</td><td>d</td></tr>
<tr><td>5</td><td>b</td></tr>
<tr><td>6</td><td>a</td></tr>
<tr><td>7</td><td>d</td></tr>
<tr><td>8</td><td>a</td></tr>
<tr><td>9</td><td>a</td></tr>
<tr><td>10</td><td>d</td></tr>
<tr><td>11</td><td>d</td></tr>
<tr><td>12</td><td>a</td></tr>
<tr><td>13</td><td>a</td></tr>
<tr><td>14</td><td>d</td></tr>
<tr><td>15</td><td>a</td></tr>
<tr><td>16</td><td>c</td></tr>
<tr><td>17</td><td>d</td></tr>
<tr><td>18</td><td>a</td></tr>
<tr><td>19</td><td>a</td></tr>
<tr><td>20</td><td>c</td></tr>
<tr><td>21</td><td>Domain = [-1,1]
Range = [0 , π]</td></tr>
<tr><td>22</td><td><table>
<tr><td>xi</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>pi</td><td>20C2/60C2</td><td>20C1 X 40C1/ 60C2</td><td>40C2/60C2</td></tr>
<tr><td></td><td>19/177</td><td>80/177</td><td>78/177=26/59</td></tr>
<tr><td>Xi pi</td><td>0</td><td>80/177</td><td>156/177</td></tr>
</table>
E(x) = $\sum xipi$ = 236/177</td></tr>
<tr><td>23</td><td>U = $\tan^{-1} x$ V = logx
du/dx = $\frac{1}{1+x^2}$ dv/dx = 1/x
du/dv = x/$1 + x^2$</td></tr>
</table>

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Solution

$f(x) = 2x^3 - 3x^2 - 36x + 7$

Differentiating w.r.t x,

$f'(x) = 6x^2 - 6x - 36$

$\Rightarrow f'(x) = 6(x^2 - x - 6)$

$\Rightarrow f'(x) = 6(x - 3)(x + 2)$

Putting $f'(x) = 0$

$6(x + 2)(x - 3) = 0$

$\Rightarrow x = -2, 3$

Intervals	Sign of $f'(x) = 6(x-3)(x+2)$	Nature of function f
$(-\infty, -2)$	$(-)(-) > 0$	increasing
$-2, 3$	$(+)(-) < 0$	decreasing
$(3, \infty)$	$(+)(+) > 0$	increasing

Hence, (a) increasing in

$(-\infty, -2) \cup (3, \infty)$

(b) decresing in

$(-2, 3)$

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- Let E_1 be the event that the dacoit is killed by a bullet.
- The probability that the dacoit is killed by one bullet is given as $P(E_1) = 0.6$
.
- Therefore, the probability that the dacoit is not killed by one bullet (denote this event as E_2) is:

$P(E_2) = 1 - P(E_1) = 1 - 0.6 = 0.4$

2. **Calculating the Probability of Survival**:
- The dacoit will still be alive after four bullets if he is not killed by any of the bullets. Since the bullets are fired independently, the probability that he is not killed by all four bullets is:

$$P(\text{not killed by 4 bullets}) = P(E_2) \times P(E_2) \times P(E_2) \times P(E_2) = P(E_2)^4$$

- Substituting the value of $P(E_2)$:

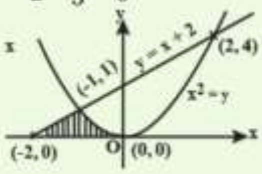
$P(\text{not killed by 4 bullets}) = (0.4)^4$

3. **Calculating** $(0.4)^4$:

- We calculate $(0.4)^4$:

$(0.4)^4 = 0.4 \times 0.4 \times 0.4 \times 0.4 = 0.0256$

26	$\Rightarrow \frac{dy}{dx} = (1+y^2)(1+x)$ $\Rightarrow \frac{dy}{1+y^2} = (1+x)dx$ On integrating bothe sides, we get $\tan^{-1}y = x + \frac{x^2}{2} + K$ ...(i) when y=0 and x=0, then substituting these values in Eq. (i), we get $\tan^{-1}(0) = 0 + 0 + K$ $\Rightarrow K = 0$ $\Rightarrow \tan^{-1}y = x + \frac{x^2}{2}$ $\Rightarrow y = \tan(x + \frac{x^2}{2})$
27	$\frac{x^2+x+1}{(x+1)(x+2)} = \frac{A}{x+2} + \frac{Bx+C}{x^2+1}$ $\int \frac{x^2+x+1}{(x+2)(x^2+1)}\,dx = \int \frac{3}{5(x^2+1)}\,dx + \int \frac{1}{5}\frac{(2x+1)}{x^2+1}\,dx$ $= \int \frac{3}{5(x^2+1)}\,dx + \frac{1}{5}\int \frac{2x}{x^2+1}\,dx + \frac{1}{5}\int \frac{1}{x^2+1}\,dx$ $= \frac{3}{5}\log\|x+2\| + \frac{1}{5}\log\|x^2+1\| + \frac{1}{5}\tan^{-1}(x) + C$
28	$\frac{dy}{dx} - 3y\cot x = \sin 2x; y = 2$ when $x = \frac{\pi}{2}$ $\frac{dy}{dx} - 3y\cot x = \sin 2x$ $\frac{dy}{dx} + (-3\cot x)\,y = (\sin 2x)$ ...(1) Comparing with $\frac{dy}{dx} + Py = Q$ **$P = -3\cot x$ & $Q = \sin 2x$** **$y \times \mathrm{cosec}^3 x = \int \sin 2x.\mathrm{cosec}^3 x\,dx$** $y\,\mathrm{cosec}^3 x = \int \frac{2\sin x\cos x}{\sin^3 x}\,dx$ $y\,\mathrm{cosec}^3 x = \int \frac{2\cos x}{\sin^2 x}\,dx$ $y\,\mathrm{cosec}^3 x = 2\int \frac{\cos x}{\sin x} \times \frac{1}{\sin x}\,dx$ $y\,\mathrm{cosec}^3 x = 2\int \cot x\,\mathrm{cosec}\,x\,dx$ $y\,\mathrm{cosec}^3 x = 2(-\mathrm{cosec}\,x) + C$ $y = \frac{-2}{\mathrm{cosec}^2 x} + \frac{C}{\mathrm{cosec}^3 x}$ **$y = -2\sin^2 x + C\sin^3 x$** ...(2)

	Putting $x = \frac{\pi}{2}, y = 2$ in (2) $2 = -2\sin^2\frac{\pi}{2} + C\sin^3\frac{\pi}{2}$ $2 = -2(1)^2 + C(1)^3$ $2 = -2 + C$ $C = 2 + 2$ **$C = 4$**
30	[illegible]
32	**Solution** The correct option is **D** $\frac{5}{6}$ Required Area is given by $\int_{-2}^{-1}(x+2)dx + \int_{-1}^{0}x^2dx$ $= \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$. 
33	**Solution** Let $P(2, -1, 5)$ be the given point and AB the given line $\frac{x-11}{10} = \frac{y+2}{-4} = \frac{z+8}{-11} = r$ (say) Draw $PM \perp AB$. Produce PM to P ' such that PM = MP '. Then P ' is image of P in AB. Any point on AB is $M(10r+11, -4r-2, -11r-8)$ Then, dr's of MP are $10r + 11 - 2, -4r - 2 - (-1), -11r - 8 - 5$ i.e., $10r + 9, -4r - 1, -11r - 13$ and the d.c's of AB are proportional to $10, -4, -11$ $\therefore MP \perp AB$ $\therefore 10(10r+9) - 4(-4r-1) - 11(-11r-13) = 0$ $\Rightarrow r = -1$ From equation (i), $M \equiv (1, 2, 3)$ Let P ' be the point (α, β, γ) Since $M(1, 2, 3)$ is the mid point of PP '

	$\Rightarrow r = -1$ From equation (i), M = (1, 2, 3) Let P' be the point (α, β, γ) Since M(1, 2, 3) is the mid point of PP' $\therefore 1 = \frac{\alpha+2}{2}, 2 = \frac{\beta-1}{2}, 3 = \frac{\gamma+5}{2} \Rightarrow \alpha = 0, \beta = 5, \gamma = 1$ $\therefore P' = (0, 5, 1)$ thus P' = (0, 5, 1) is the image of P(2, −1, 5) in the line AB. Also, $MP = \sqrt{(1-2)^2 + (2+1)^2 + (3-5)^2} = \sqrt{1+9+4} = \sqrt{14}$
34	$I = \int_{-1}^{3/2} \lvert x \sin \pi x \rvert \, dx$ $\Rightarrow I = \int_{-1}^{0} (-x)(-\sin \pi x)\, dx + \int_{0}^{1} x \sin \pi x \, dx + \int_{1}^{3/2} x(-\sin \pi x)\, dx$ $\Rightarrow I = \int_{-1}^{1} x \sin \pi x \, dx - \int_{1}^{3/2} x \sin \pi x \, dx$ $I_1 = \int_{-1}^{1} x \sin \pi x \, dx \quad \cdots (1)$ $\Rightarrow I_1 = 2\int_{0}^{1} x \sin \pi x \, dx$ $\Rightarrow I_1 = 2\int_{0}^{1} (1-x) \sin \pi x \, dx \quad \cdots (2)$ Adding (1) and (2), $\Rightarrow I_1 = \int_{0}^{1} \sin \pi x \, dx$ $\Rightarrow I_1 = -\left[\frac{\cos \pi x}{\pi}\right]_0^1$ $\Rightarrow I_1 = \frac{2}{\pi}$ $I_2 = \int_{1}^{3/2} x \sin \pi x \, dx$ $I_2 = \int_{1}^{3/2} x \sin \pi x \, dx$ $\Rightarrow I_2 = \left[\frac{-x \cos \pi x}{\pi}\right]_1^{3/2} + \int_{1}^{3/2} \frac{\cos \pi x}{\pi} dx$ $\Rightarrow I_2 = -\frac{1}{\pi} + \left[\frac{\sin \pi x}{\pi^2}\right]_1^{3/2}$ $\Rightarrow I_2 = -\frac{1}{\pi} - \frac{1}{\pi^2}$ Therefore, $I = \frac{2}{\pi} + \frac{1}{\pi} + \frac{1}{\pi^2}$

35	**Reflexive:** Let a be a real number. If a R a $\Rightarrow$ a – a + √5 = √5 As we know that, √5 is irrational and hence **R is reflexive**. **Symmetric:** Let a = √5, b = 2. $\Rightarrow$ a – b + √5 = √5 – 2 + √5 = 2 (√5 - 1) ∵ 2 (√5 - 1) is an irrational number $\Rightarrow$ **(a, b)** ∈ **R** Now, let's check whether (b, a) ∈ R or not. If (b, a) ∈ R $\Rightarrow$ b – a + √5 is an irrational number. By substituting the value of a and b in the above equation we have, $\Rightarrow$ b – a + √5 = 2 - √5 + √5 = 2 ∵ 2 is not an irrational number $\Rightarrow$ **(b, a) ∉ R.** Hence, the given relation **R is not symmetric**. **Transitive:** Let a = 1 + √5, b = 4, c = 2√5. As we can see that, a – b + √5 = - 3 + 2√5. ∵ - 3 + 2√5 is an irrational number $\Rightarrow$ **(a, b)** ∈ **R** Similarly, we can see that, b – c + √5 = 4 - √5, ∵ 4 - √5 is an irrational number $\Rightarrow$ **(b, c)** ∈ **R.** Let's check whether (a, c) ∈ R or not. $\Rightarrow$ a – c + √5 = (1 + √5) – 2√5 + √5 = 1. $\Rightarrow$ a – c + √5 = (1 + √5) – 2√5 + √5 = 1. ∵ 1 is not an irrational number $\Rightarrow$ **(a, c) ∉ R.** As, **(a, b) and (b, c)** ∈ **R but (a, c) ∉ R.** Hence, the given relation **R is not transitive**.