IGNOU | BCA

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FREE

SOLVED ASSIGNMENT

All In One

BCS-012
Mathematics

Prepared by

ISM

730-339-3555

www.ignoustudymentor.com

@ism_ignoustudymentor_

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STEP 1

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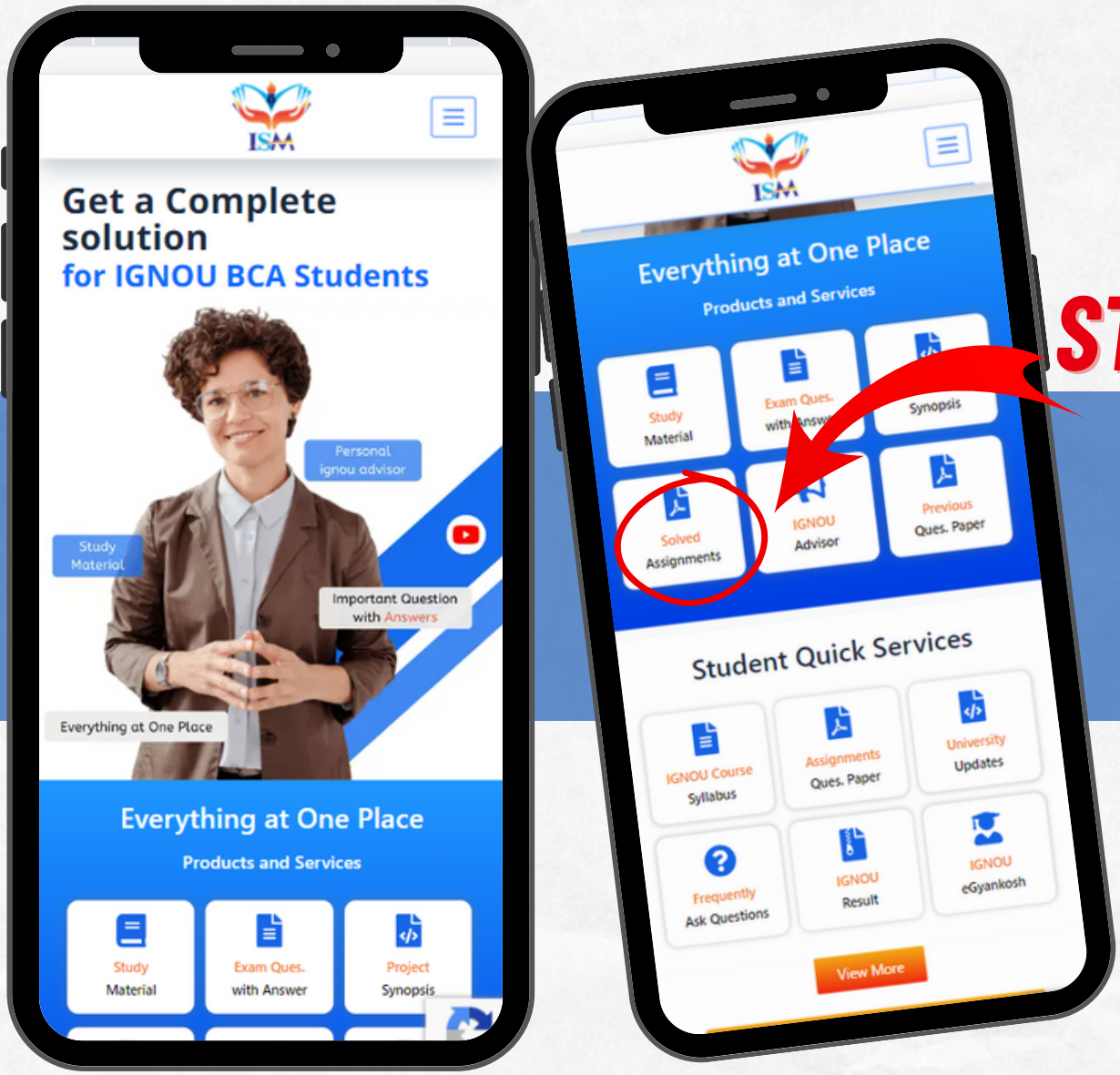

STEP 2

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MATHEMATICS - [SEM-1]

Ques.13 Using integration, find length of curve y=3-x from (-1,4) to (3,0)

$y = 3 - x$ from $(-1, 4)$ to $(3, 0)$

$\frac{dy}{dx} = -1$

$= \int_{-1}^{3} \sqrt{1 + 1} \, dx$

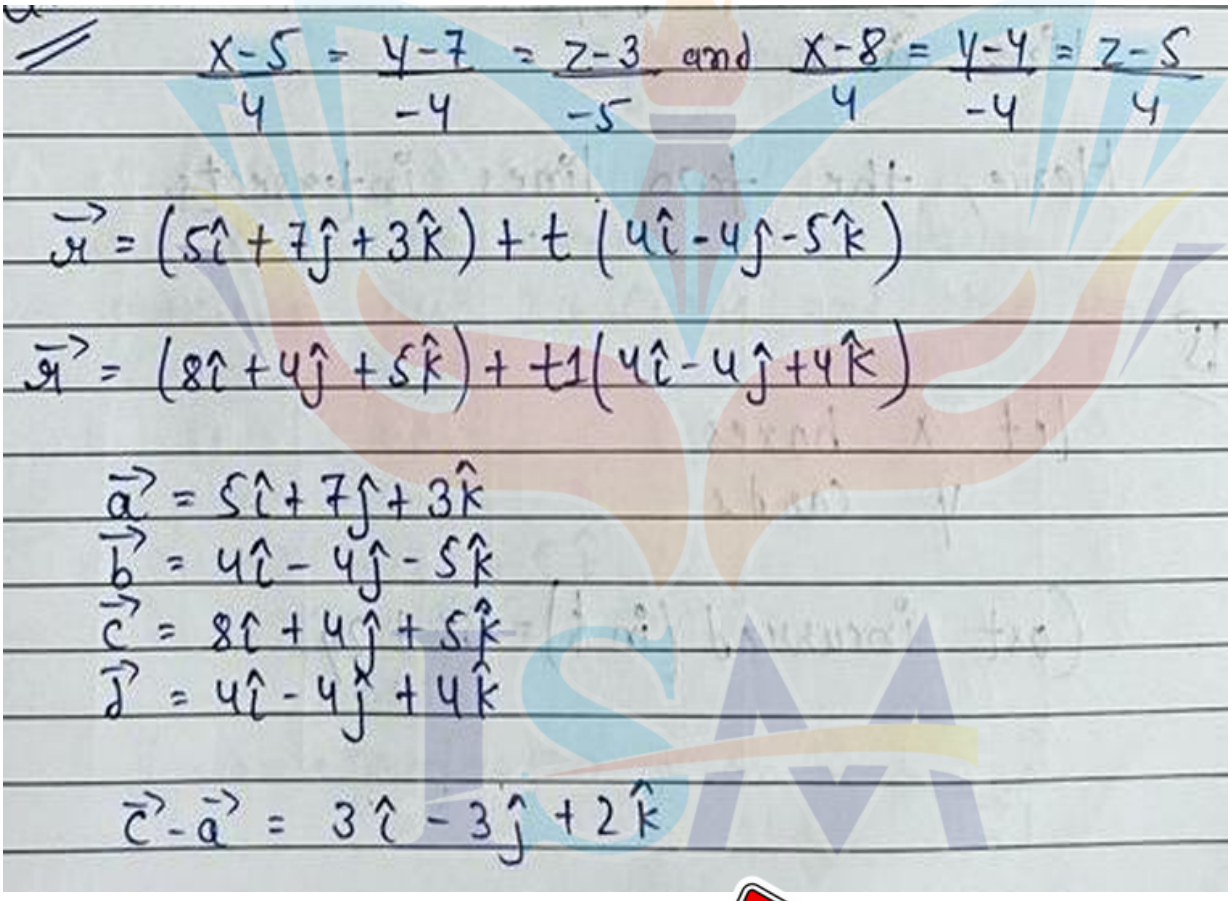
$= \sqrt{2} x_{-1}^{3}$

$= \sqrt{2} (3 + 1)$

$= 4\sqrt{2}$ units

Ques.14 Show that the lines, given below, Intersect each other.

$$\frac{X-5}{4}=\frac{y-7}{-4}=\frac{z-3}{-5} \text{ and } \frac{X-8}{4}=\frac{y-4}{-4}=\frac{z-5}{4}$$



$$\frac{x-5}{4}=\frac{y-7}{-4}=\frac{z-3}{-5} \text{ and } \frac{x-8}{4}=\frac{y-4}{-4}=\frac{z-5}{4}$$

$$\vec{r}=(5\hat{i}+7\hat{j}+3\hat{k})+t(4\hat{i}-4\hat{j}-5\hat{k})$$

$$\vec{r}=(8\hat{i}+4\hat{j}+5\hat{k})+t1(4\hat{i}-4\hat{j}+4\hat{k})$$

$$\vec{a}=5\hat{i}+7\hat{j}+3\hat{k}$$
$$\vec{b}=4\hat{i}-4\hat{j}-5\hat{k}$$
$$\vec{c}=8\hat{i}+4\hat{j}+5\hat{k}$$
$$\vec{d}=4\hat{i}-4\hat{j}+4\hat{k}$$

$$\vec{c}-\vec{a}=3\hat{i}-3\hat{j}+2\hat{k}$$

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MATHEMATICS - [SEM-1]

$$\vec{b} \times \vec{d} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & -4 & -5 \\ 4 & -4 & 4 \end{vmatrix}$$

$$= \hat{i}(-16-20) - \hat{j}(16+20) + \hat{k}(-16+16)$$

$$= \hat{i}(-36) - \hat{j}(36) + \hat{k}(0)$$

$$= -36\hat{i} - 36\hat{j}$$

$$(\vec{c}-\vec{a}).(\vec{b}\times\vec{d}) = (3\hat{i} - 3\hat{j} + 2\hat{k}).(-36\hat{i} - 36\hat{j})$$

$$= -108 + 108$$

$$= 0$$

The shortest distance between the line is 0.

Hence, the two lines intersects.

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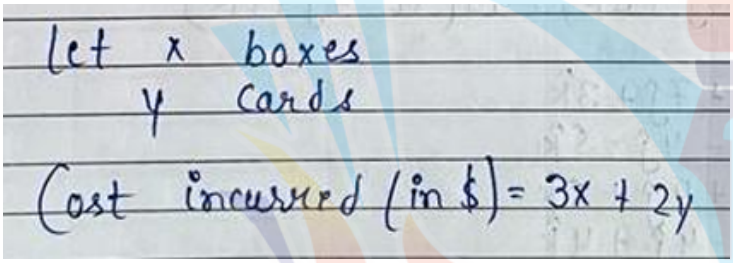
MATHEMATICS - [SEM-1]

Ques.15 A tailor needs at lease 40 large buttons and 60 small buttons. In the market, buttions are available in two boxes or cards. A box contains 6 large and 2 small buttons and a card contains 2 large and 4 small buttons. If the cost of a box is $3 and cost of a card is $2, find how many boxes and cards should be purchased so as to minimize the expenditure.



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MATHEMATICS - [SEM-1]

Large buttons : $6x + 2y >= 40$

Small buttons $2x + 4y >= 60$

Minimise : $C = 3x + 2y$

$C(A) = C(0, 20) = 3(0) + 2(20) = 40$

$C\left(\frac{5}{2}, \frac{55}{2}\right) = 3\left(\frac{5}{2}\right) + 2\left(\frac{55}{2}\right) = 62.5$

$C(30, 0) = 3(30) + 2(0) = 90$

The least cost occurs when tailor purchases just 20 cards and the least cost is 40.

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MATHEMATICS - [SEM-1]

Ques. 16 Find the scalar component of projection of the vector.

$\vec{a} = 2\hat{i} + 3\hat{j} + 5\hat{k}$ on the vector $\vec{b} = 2\hat{i} - 2\hat{j} - \hat{k}$

$\vec{a} = 2\hat{i} + 3\hat{j} + 5\hat{k}$

$\vec{b} = 2\hat{i} - 2\hat{j} - \hat{k}$

Scalar projection $\vec{a}$ on $\vec{b} = \frac{\vec{a} \cdot \vec{b}}{|\vec{b}|}$

$\vec{a} \cdot \vec{b} = 2(2) + 3(-2) + 5(-1) = -7$

$|\vec{b}| = \sqrt{2^2 + (-2)^2 + (-1)^2}$

$= \sqrt{9} = 3$

Scalar projection of $\vec{a}$ on $\vec{b} = -\frac{7}{3}$

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