Maths

21/07/2022

Natalie Coplin

li

a) $\frac{4a^3 - 6a^2 - 12a}{2a}$

$2a \times 2a^2 = 4a^{2+1}$

$2a \times 3a = 6a^2$

$2a \times 6 = 12a$

$= 2a \overline{)\,4a^3 - 6a^2 - 12a}$ $\quad 2a^2 - 3a - 6$

$\boxed{2a^2 - 3a - 6}$

lii

b) $\frac{59x^3y^3 + 15z^4y^2 + 3x^5z}{3x^5y}$

$59x^3y^3 / 3x^5y$

$59x^{3-5} = x^{-2}$

$y^3 - y$

$y^{3-1} = y^2$

$= \boxed{59x^{-2}y^2 + 15z^4y + z}$

liii

c) $\frac{6x^2 + 19x + 10}{x + 5}$

$6x - 11 + 6$

$x + 5 \overline{)\,6x^2 + 19x + 10}$

$-30x$

$-11x + 10$

$+6$

$\boxed{6x - 11 + 6}$

$6x \times x = 6x^2$

$6x \times 5 = +30x$

$+30x \Rightarrow -30x$

$-11 \times x = -11x$

$-11 \times 5 = -6$

$\rightarrow +6$

$6x - 11 + 65$

$x + 5 \overline{)\,6x^2 + 19x + 10}$

$-30x$

$-11x + 10$

$+55$

$x \times 6x = 6x^2$

$11 \times x = 11x$

$\boxed{6x - 11 + 65}$

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Q1

iv $\frac{6p^2 q^3 r}{3p^3 q^3 r^{-2}}$

$= 2p^{-1} \times 1^{-1}$

$\times \rightarrow +$

$\div \rightarrow -$

$2p^{-1} \times 3p^3$

$6p^2$

r / r^{-2} $\quad r^1$

$r / r = 1$ $\quad r^{-2}$

r^1 / r^{-2} $\quad 1 - 2 = -1$

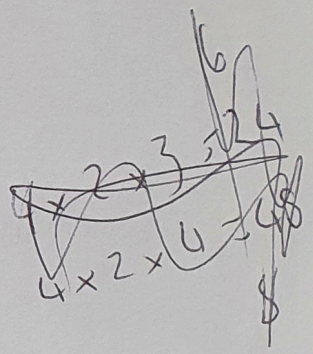
1^{-1}

v $\frac{2fg}{16h} \times \frac{4gh^2}{4fh} \times \frac{32fh^3}{12f^3}$

$= \frac{2fg}{16h} \times \frac{gh^2}{fh} \times \frac{16fh^3}{6f^3}$

$= \frac{2fg}{16h} \times \frac{gh}{f} \times \frac{8fh^3}{3f^3}$

$= \frac{2fg}{16h} \times \frac{gh}{f} \times \frac{8h^3}{3f^2}$



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②

② $(2x-1)(3x+5) = (6x-5)(x-9)$

$6x^2 + 10x - 3x + 4 = 6x^2 - 54x - 5x + 45$

$= 10x - 3x + 4 = -54x - 5x + 45$

$= 7x + 4 = -59x + 45$

$-7x$

$= 4 = -66x + 45$

$-41 = -66x$

$x = \frac{-41}{-66}$

$x = 0.621$

Question 2
ai

-45

$(2x-1)(3x+5) = (6x-5)(x-9)$

$6x^2 + 10x - 3x - 5 = 6x^2 - 54x - 5x + 45$

$10x - 3x - 5 = -54x - 5x + 45$

$7x - 5 = -59x + 45$

$-7x$

$-5 = -66x + 45$ -45

$-50 = -66x$

$x = \frac{-50}{-66}$

$x = 0.75$

2aii

$\frac{x-4}{4} = \frac{2x-1}{3}$

cross multiply / remove bottom

$= (x-4)3 = (2x-1)4$

$= 3x - 12 = 8x - 4$ $+4$

$= 3x - 8 = 8x$ $-3x$

$-8 = 5x$

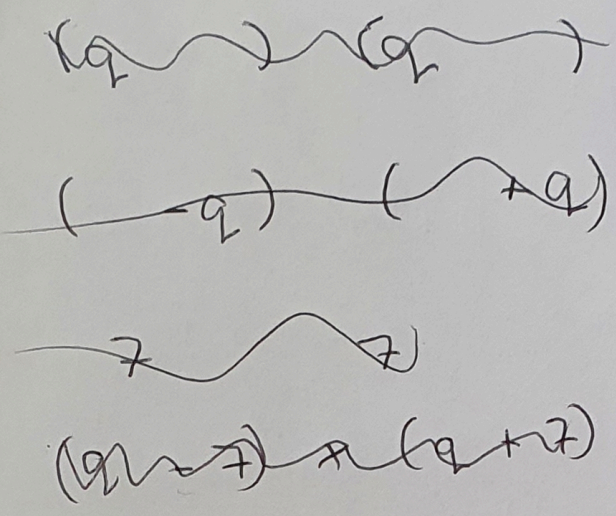
$x = \frac{-8}{5}$

$x = -1.6$

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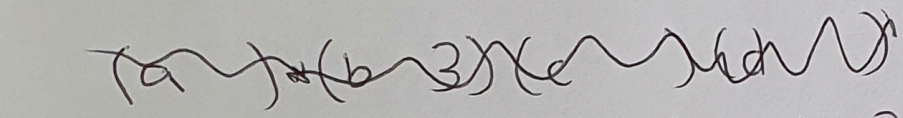
Q2b

(i) $49 - q^2$



$(-7 - q) \times (7 + q)$

(ii) $3ab + 4cd - cb - 12ad$



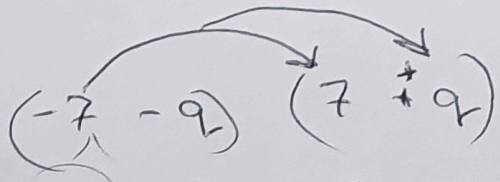
$3ab + 4cd - cb - 4 \times 3ad$

$3a$

$(b - 4d) - (3a - c)$

(iii) $9q^2 - 81qr$

$= 3q(3q - 27r)$



$49 + 7q - 7q$

$-q \times 7$

③

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(4)

$2x + 4y = 16$

$\times 2 \quad 3x + 2y = 7$

$3 \times (2x + 4y = 16) = 6x + 12y = 48$

$2 \times (3x + 2y = 7) = 6x + 4y = 14$

$6x + 12y = 48$

$- \quad 6x + 4y = 14$

$0 \quad 8y = 34$

$y = \frac{34}{8} = \underline{4.25}$

~~$2 \times 3x = 6x$~~ ~~14~~

~~$2 \times 2y = 4y$~~

Then

$2x + (4 \times 4.25) = 16$

$2x + 17 = 16$

$2x = 16 - 17 = -1$

$2x = -1$

$x = \frac{-1}{2}$ $\quad \underline{x = 0.5}$

~~$2x + 4y = 16$~~

$2x + 4y = 16$

$\times 2 \quad 3x + 2y = 7$

$- \quad 6x + 4y = 14$

$-4x = = 2$

$x = \frac{2}{-4}$

Check

~~$(3 \times 0.5) + (2 \times 4.25) = 7$~~

$1.5 +$

$x = 0.5$

$y = 4.25$

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Q4 and Q5

I have not been taught matrices

See pages 6, 7, 8

Q5

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 2 & 2 \\ 1 & 6 & -1 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 0 & 6 \\ 1 & 3 & -1 \end{bmatrix}$$

$$A \times B = \begin{matrix} (1\times1)+(1\times4)+(3\times1) \\ (1\times2)+(2\times0)+(2\times3) \\ (1\times3)+(0\times6)+(-1\times-1) \end{matrix}$$

$$= \begin{matrix} 1+4+3 \\ 2+2+6 \\ 3+0+1 \end{matrix}$$

$$= \begin{matrix} 8 \\ 10 \\ 4 \end{matrix}$$

A B C
D E F
G H I

J K L
M N O
P Q R

$1\times1 = a\times e$
$1\times4 = b\times g$
$1\times2 = a\times f$
$1\times$

$$A \times B = \begin{bmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{bmatrix}$$

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Q4 Determinant then inverse A^{-1}

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 2 & 2 \\ 1 & 0 & -1 \end{bmatrix}$$

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = a\begin{vmatrix} e & f \\ h & i \end{vmatrix} - b\begin{vmatrix} d & f \\ g & i \end{vmatrix} + c\begin{vmatrix} d & e \\ g & h \end{vmatrix}$$

$$1\begin{vmatrix} 2 & 2 \\ 0 & -1 \end{vmatrix} - 1\begin{vmatrix} 1 & 2 \\ 1 & -1 \end{vmatrix} + 3\begin{vmatrix} 1 & 2 \\ 1 & 0 \end{vmatrix}$$

a $2 \times -1 = -2$
$0 \times 2 = 0$

$1 \times -2 = -2$

$-1 \times 1 = -1$

b $1 \times -1 = -1$
$1 \times 2 = 2$

1

c $1 \times 0 = 0$
$1 \times 2 = 2$

$3 \times 2 = 6$

$$a - b + c$$
$$-2 - -1 + 6$$

$$= \frac{5}{5}$$

Q6 $\dfrac{x+7}{(x-2)(x-1)}$

$$\frac{x(x-1)}{x-2} + \frac{7(x-2)}{(x-1)}$$

$$\frac{A(x-1)}{x-2} + \frac{B(x-2)}{(x-1)} = x+7$$

$$x+7 = A(x-1) + B(x-2)$$

Let $x = 1$

$$1+7 = A(0) + B(1-2)$$
$$8 = B(-1)$$
$$B = \frac{8}{-1} = -8 \qquad B = -8$$

Let $x = 2$

$$x+7 = A(x-1) + B(x-2)$$
$$2+7 = A(2-1) + B(0)$$
$$9 = A(1)$$
$$A = \frac{9}{1} = 9 \qquad A = 9$$

$$= \frac{9}{(x-2)} + \frac{-8}{(x-1)}$$

Q4 cont.

Inverse

$$A^{-1} = \left(\frac{1}{\det A}\right) \text{adj } A$$

$$A^{-1} = \left(\frac{1}{5}\right) \text{adj } A$$

$$A^{-1} = \frac{1}{5}\begin{bmatrix} 1 & -f & c \\ -h & e & -b \\ g & -d & a \end{bmatrix}$$