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C1 SECT A.

1. n is a positive integer ... show n^2+n is always even.

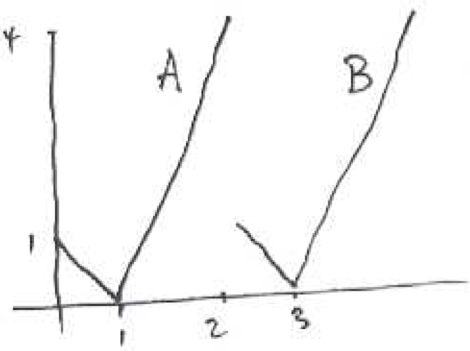
$n^2+n = n(n+1)$

if n is odd then $n+1$ is even

OR if n is even $n+1$ is odd

odd $\times$ even OR even $\times$ odd is always even.

2.



(i) $A + \begin{pmatrix} 2 \\ 0 \end{pmatrix} = B$

Translation $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

(ii) if A has eq^n $y = f(x)$

then B has eq^n $y = f(x-2)$

3. $(2+x)^4 = 1(2)^4 + 4(2)^3x^1 + 6(2)^2x^2 + 4(2)^1x^3 + 1x^4$

$= 16 + 32x + 24x^2 + 8x^3 + x^4$

4. Solve $\dfrac{3(2x+1)}{4} > -6$ $(\times 4)$

$3(2x+1) > -24$

$6x+3 > -24$ (-3)

$6x > -27$ $(\div 6)$

$x > -\frac{27}{6}$

$= (x > -4.5)$

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5. make C the subject...

$$P = \frac{C}{C+4}$$

$$P(C+4) = C$$

$$PC + 4P = C$$

$$PC - C = -4P$$

$$C(P-1) = -4P$$

$$C = \frac{-4P}{P-1}$$

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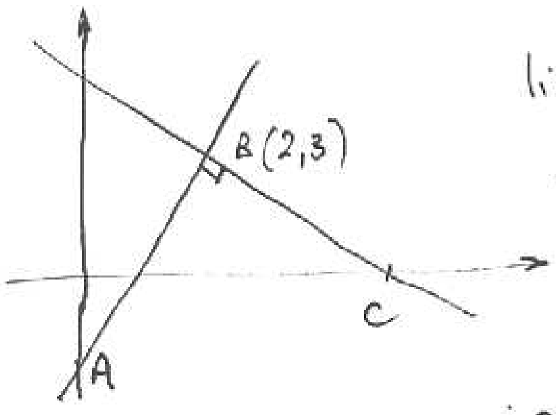
6. $x^3 + 3x + k$ is divided by $(x-1)$, remainder is 6, find k

$f(1) = 6 \quad \therefore \; 1^3 + 3\times 1 + k = 6 \Rightarrow k = 6 - 4$

$k = 2$

7.



line AB is $y = 4x - 5$

find eqn of line BC

$m_{AB} = 4 \quad \therefore \; m_{BC} = -\frac{1}{4}$

$\therefore$ eqn of BC $\quad (y-3) = -\frac{1}{4}(x-2)$

$y = -\frac{1}{4}x + \frac{7}{2}$

$\hookrightarrow -\frac{1}{4}x - 2 + 3$

$\frac{1}{2} + 3 = 3\frac{1}{2} \; \left(\frac{7}{2}\right)$

$(\times 4) \quad 4y = -x + 14$

line BC is $\quad x + 4y = 14$.

$\therefore$ pt C (when $y = 0$) $x = 14 \quad \underline{C(14, 0)}$

8. $5\sqrt{8} + 4\sqrt{50}$; simplify ... give answer in $a\sqrt{b}$ with b as small as possible (a, b are integers)

$5\sqrt{8} + 4\sqrt{50}$

$= 5\sqrt{4\times 2} + 4\sqrt{25\times 2}$

$= 5\times 2\sqrt{2} + 4\times 5\sqrt{2} = \underline{\underline{30\sqrt{2}}}$

$(10\sqrt{2}) + (20\sqrt{2})$

$\frac{\sqrt{3}}{6-\sqrt{3}} \times \frac{6+\sqrt{3}}{6+\sqrt{3}} = \frac{6\sqrt{3}+3}{36-6\sqrt{3}+6\sqrt{3}-\sqrt{3}\sqrt{3}} = \frac{3+6\sqrt{3}}{36-3}$

(Express in form $p+q\sqrt{3}$)

$= \frac{3}{33} + \frac{6\sqrt{3}}{33}$

$= \frac{1}{11} + \frac{2\sqrt{3}}{11}$

[p and q are rational ; $p = \frac{1}{11}$ $q = \frac{2}{11}$]

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9. Find range of values for k for which $x^2+5x+k=0$ has one or more real roots $\Rightarrow$ USE "DISCRIMINANT"

this implies $b^2-4ac \geqslant 0$

(a repeated root AND 2 distinct roots)

in $x^2+5x+k=0$ $a=1$ $b=5$ $c=k$

$\therefore b^2-4ac = 5^2 - 4\times 1\times k = 25-4k$

solving $25-4k \geqslant 0$

$-4k \geqslant -25$ $(\div(-4))$ $\rightarrow$ note... REVERSES the INEQUALITY SIGN!

$k \leqslant \frac{-25}{-4}$ $(= 6\tfrac{1}{4})$

$\underline{k \leqslant 6\tfrac{1}{4}}$

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No. 9. (ii) [ALL METHODS GIVEN ... just to fill up the page!!] You only need ONE!

Solve $4x^2 + 20x + 25 = 0$

Using formula $a = 4$ $b = 20$ $c = 25$

$$x = \frac{-20 \pm \sqrt{20^2 - 4 \times 4 \times 25}}{8} = \frac{-20}{8} \pm \frac{\sqrt{400 - 400}}{8}$$

$$\therefore x = -2\tfrac{1}{2}$$

RECOMMENDED METHOD!...

by factorising

$$4x^2 + 20x + 25 = 0$$

$$(2x + 5)(2x + 5) = 0$$

$$2x + 5 = 0 \qquad x = -5/2 \; (= -2\tfrac{1}{2})$$

by 'completing the square'

$$4x^2 + 20x + 25 = 4\left(x^2 + 5x + \frac{25}{4}\right)$$

$$= 4\left[\left(x + \frac{5}{2}\right)^2 \underbrace{- \left(\frac{5}{2}\right)^2 + \frac{25}{4}}\right]$$

$$-\left(\frac{5}{2}\right)^2 + \frac{25}{4} = 0$$

$$= 4\left(x + \frac{5}{2}\right)^2$$

so $4\left(x + \frac{5}{2}\right)^2 = 0$

$$\left(x + \frac{5}{2}\right)^2 = 0$$

$$x + 5/2 = 0 \implies x = -2\tfrac{1}{2}$$