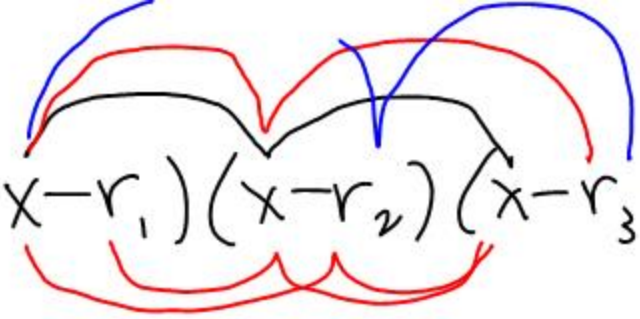
Expand $(x-r_1)(x-r_2)(x-r_3)$



$= x^3 + x^2(-r_1 - r_2 - r_3) + x(r_1r_2 + r_1r_3 + r_2r_3) - r_1r_2r_3$

3C **11a** $x^2 - 3x + 2 = 0$ (opp: -3, same: 2)

$$\frac{2}{x_1} + \frac{2}{x_2} = \frac{2x_2}{x_1x_2} + \frac{2x_1}{x_1x_2} = \frac{2(x_1+x_2)}{x_1x_2}$$

$$= \frac{2(3)}{2} = 3$$

(h) $7x^2 \overset{\text{opp}}{+} 4x \overset{\text{same}}{-} 5 = 0 \rightarrow x^2 + \frac{4}{7}x - \frac{5}{7} = 0$

$$(x_1 - x_2)^4 = (x_1 - x_2)(x_1 - x_2)(x_1 - x_2)(x_1 - x_2)$$

$$= x_1^4 + 4x_1^3(-x_2) + 6x_1^2(-x_2)^2 + 4x_1^1(-x_2)^3 + (-x_2)^4$$

$(x_1 - x_2)^4 =$

$$= x_1^4 - 4x_1^3x_2 + 6x_1^2x_2^2 - 4x_1x_2^3 + x_2^4$$

$$(x_1 + x_2)^4 = x_1^4 + 4x_1^3x_2 + 6x_1^2x_2^2 + 4x_1x_2^3 + x_2^4$$

$$(x_1 - x_2)^4 = (x_1 + x_2)^4 - 8x_1^3x_2 - 8x_1x_2^3$$

$$= (x_1 + x_2)^4 - 8x_1x_2\left[x_1^2 + x_2^2\right]$$

$$= (x_1 + x_2)^4 - 8x_1x_2\left[(x_1 + x_2)^2 - 2x_1x_2\right]$$

$$= \left(-\frac{4}{7}\right)^4 - 8\left(\frac{-5}{7}\right)\left[\left(\frac{4}{7}\right)^2 - 2\left(\frac{-5}{7}\right)\right] = \frac{24336}{2401}$$

$x_1^2 + 2x_1x_2 + x_2^2$

Arithmetic of Complex Numbers $(a+bi)$

$i = \sqrt{-1}$

Ex. $(4-3i)(4-3i)$

$= 16 - 24i + 9i^2$ (−9)

$= 7 - 24i$

Never leave a power of i

$i^2 = -1$

$i^3 = -i$

$i^4 = 1$

Ex. $(3+2i)^4$

$= 3^4 + \underline{(4)(3)^3(2i)^1} + (6)(3)^2(2i)^2$ (4·27·2; 6·9·4)

$+ \underline{(4)(3)^1(2i)^3} + (2i)^4$ (4·3·8)

$= \underline{81} + \underline{216i} - \underline{216} - \underline{96i} + \underline{16}$

$= -119 + 120i$

Ex. $(1-i)^6$

$= 1^6 + \binom{6}{5}1^5(-i)^1 + \binom{6}{4}1^4(-i)^2 + \binom{6}{3}1^3(-i)^3$

$+ \binom{6}{2}1^2(-i)^4 + \binom{6}{1}1^1(-i)^5 + (-i)^6$

$i^6 = i^4 \cdot i^2$, $i^2 = -1$

$= 1 - 6i - 15 + 20i + 15 - 6i - 1$

$= 8i$

Ex. $\dfrac{2+i}{1-i} \cdot \dfrac{1+i}{1+i} = \dfrac{2+3i-1}{1+1}$

$= \dfrac{1+3i}{2} = \dfrac{1}{2} + \dfrac{3}{2}i$

Ex- Find $\sqrt{3+4i}$

$$\sqrt{3+4i} = a+bi$$

$$3+4i = a^2+2abi-b^2$$

$$3+4i = (a^2-b^2)+(2ab)i$$

$$\begin{cases} 3 = a^2-b^2 \\ 4 = 2ab \longrightarrow a = \frac{2}{b} \end{cases}$$

$$3 = \left(\frac{2}{b}\right)^2 - b^2$$

$$3 = \frac{4}{b^2} - b^2$$

$$3b^2 = 4 - b^4$$

$$b^4+3b^2-4 = 0$$

$$(b^2+4)(b^2-1) = 0$$

b^2+4: no reals

$$b = 1 \text{ or } b = -1$$

$$a = 2 \text{ or } a = -2$$

$$\sqrt{3+4i} = 2+i \text{ or } -2-i$$

Ex. Solve for $a+b$

$$\frac{(2+i)(a+ib)}{2+i} = \frac{11-2i}{2+i}\cdot\frac{2-i}{2-i}$$

22 - 2

$$a+ib = \frac{20}{5} - \frac{15i}{5}$$

$a = 4$

$b = \frac{-15}{5} = -3$

HW

3C retry b-g as needed

3D #1

3E #1c, g

3F #1cd

#2b

#3cd

3G #3b

c