

Analytical methods Acha Akbar  
 Saeed Dawood Z103529  
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Q5)  $z_1 = 3 + 7j$ ,  $z_2 = -10j$

i)  $z_1 + z_2$

$z_1 = 3 + 7j$

$z_2 = -10j$

$(3 + 7j)(-10j)$

$3 + 7j - 10j$

$5 - 3j$

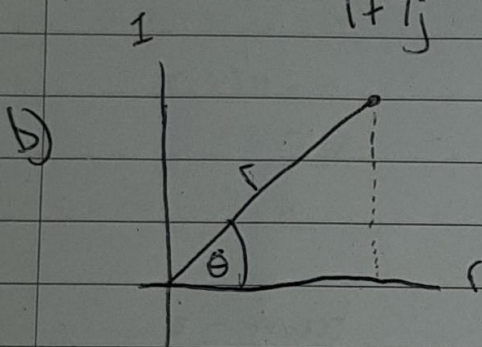
ii)  $(3 + 7j)(-2 + 10j)$

$3 + 7j - 2 + 10j$

$1 + 7j$

$1 + 7j$

$r =$



c)  $(5 + 3j)^4$   
 $r^n (\cos \theta + j \sin \theta)$

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i)  $y = 9x^3 + 7x^2 - x + 4$   
 $\frac{dy}{dx} = 27x^2 + 14x - 1$

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ii)  $y = (2x+3)(3x-5)$   
 ~~$y = 6x^2 - 1 - 0$~~   
 $\frac{dy}{dx} = 12x - 1$

iii)  $y = 2\ln(x) + 5$   
 $\frac{dy}{dx} = 2 \times \frac{1}{x} - 5 \times \frac{1}{x^2}$   
 $\frac{dy}{dx} = \frac{2x - 5}{x^2}$

iv)  ~~$y = 27x^2 + 3x - 2$~~

v)  $y = x^5 \times \sin 2x$   
 $\frac{dy}{dx} = 5x^4 \times \sin(2x) + x^5 \times \cos(2x) \times 2$   
 $\frac{dy}{dx} = 5x^4 \times \sin 2x + 2x^5 \times \cos 2x$

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07)  $\int x^5 + 2x^2 + x - 10 dx$

$$\frac{x^6}{6} + \frac{2x^3}{3} + \frac{x^2}{2} - 10x + C$$

$$\frac{x^6}{6} + \frac{2x^3}{3} + \frac{x^2}{2} - 10x + C$$

ii)  $\int (2x+5)(x^2-1) dx$

$$\int 2x^3 - 2x + 5x^2 - 5 dx$$

$$\frac{x^4}{2} - x^2 + \frac{5x^3}{3} - 5x + C$$

iii)  $\int_2^5 2x^2 x (x^2+3) dx$

$$\int 2x^2 (x^2+3) dx$$

$$2x \int x^2 (x^2+3) dx$$

$$2x \int x^4 + 3x^2 dx$$

$$2 \left( \frac{x^5}{5} + x^3 \right)$$

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ii)  $\int 5 \sin(3x) - \cos\left(\frac{x}{3}\right) dx$   
 $= -\frac{5 \cos(3x)}{3} - 3 \sin\left(\frac{x}{3}\right) + C$

Analytical methods

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# Analytical methods (Ach Alkass)

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i)  $\frac{3x-1}{5} = \frac{6x+5}{9}$

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

$$27x - 9 = 30x + 25$$

$$27x - 30x = 25 + 9$$

$$-3x = 34$$

$$x = -11.3$$

ii)  $1 + \frac{5}{x} = \frac{-6}{x^2}$

$$1 + \frac{5}{x} + \frac{6}{x^2} = 0$$

$$x^2 + 5x + 6 = 0$$

$$x^2 + 3x + 2x + 6 = 0$$

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

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

$$x+3 = 0$$

$$x+2 = 0$$

$$x = -3$$
$$x = -2$$

iii)  $2 \log(3x+1) = \log(x+3) + \log(x+7)$

$$(3x+1)(3x+1) = (x+3)(x+7)$$

$$9x + 6x + 1 = x^2 + 10x + 21$$

$$15x + 1 = x^2 + 10x + 21$$

$$15x + 1 - x^2 - 10x - 21 = 0$$

$$5x - 20 - x^2 = 0$$

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i)  $8p^3q^2 - 4p^2q^3 + 2p^3q$   
 $2p^2q(4pq - 2q^2 + p)$

ii)  $x^2 - y^2$   
 $(x-y)(x+y)$

c

i)  $x^2 + 12x + 20 = 0$   
 $x^2 + 10x + 2x + 20 = 0$   
 $x(x+10) + 2(x+10) = 0$   
 $(x+10)(x+2) = 0$   
 $x+10 = 0$   
 $x+2 = 0$   
 $x = -10 \quad x = -2$

~~ii)~~

ii)  $2x^2 + x - 15 = 0$   
 $2x^2 + 6x - 5x - 15 = 0$   
 $2x(x+3) - 5(x+3) = 0$   
 $(x+3)(2x-5) = 0$   
 $x+3 = 0$   
 $2x-5 = 0$   

$x = -3$   
 $x = 2.5$

iii)  $x^2 - 400 = 0$   
 $(x-20)(x+20) = 0$

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Q3

a

i)  $\sin x \approx 0.67$   
 $x = \sin^{-1}(0.67)$   
 $x = 42.10^\circ$

$180 - 42.10 = 137.9^\circ$

ii)  $\tan^2 x - 7 \tan x + 10 = 0$   
 $(\tan x)^2$

$x^2 - 7x + 10 = 0$

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

$\rightarrow (\tan x - 5)(\tan x - 2)$

$\tan x - 5 = 0$

$\tan x - 2 = 0$

$\tan x = 5$

$\tan x = 2$

$\tan x = 5$

$x = \tan^{-1}(5) = 78.69$

$x = 180 + 78.69$

$x = 258.69$

$\tan x = 2$

$x = \tan^{-1}(2) = 63.43$

$x = 180 + 63.43 =$

$x = 243.43$