ID # 14124

NAME # Muhammad Johar Shah

SUMMER 2020, BS-SE

SUBMITTED TO :

SIR SHAKEEL

August 20, 2020

Question # 1

$(x+yi)(x-yi) = ?$

$(x+yi)/i = (7+9i)$

$x+yi = (7+9i)i$

$x+yi = 7i+9i^2$

$x+yi = 7i+9(-1)$

$x+yi = 7i-9$

~~$(x+yi)(x-yi) = (7i-9)(7i$~~

$x+yi = -9+7i$

Now

$(x+yi)(x-yi) = (-9+7i)(-9-7i)$

$= 81+\cancel{63i}-\cancel{63i}-49i^2$

$= 81-49(-1)$

$= 81+49$

$= 130$

Scanned with CamScanner

Question #2

$$(x+yi)(2+i) = 3-i$$

$$2x + xi + 2yi + yi^2 = 3-i$$

$$2x + xi + 2yi + y(-1) = 3-i$$

$$2x + xi + 2yi - y = 3-i$$

$$2x - y + xi + 2yi = 3-i$$

$$\underbrace{(2x-y)}_{\text{real Part}} + \underbrace{(x+2y)i}_{\text{imaginary Part}} = 3-i$$

By Comparing the values

$$2x - y = 3 \quad , \quad x + 2y = -1$$

$$2x - y = 3 \quad \text{— eq (1)}$$
$$x + 2y = -1 \quad \text{— eq (2)}$$

Multiply -2 with eq (2)

$$2x - y = 3$$
$$-2x - 4y = 2$$

$$\frac{-5y}{-5} = \frac{5}{-5} \Rightarrow \boxed{y = -1}$$

$x + 2y = -1$

By Putting value in eq (2)

$x + 2(-1) = -1$

$x - 2 = -1$

$x = -1 + 2$

$\boxed{x = 1}$

— // — // — // — // — // — // — //

Scanned with CamScanner

Q # 3

$$2z^2 - 2iz - 5 = 0$$
$$2(x+yi)^2 - 2i(x+yi) - 5 = 0$$
$$2(x^2 + 2xyi + (yi)^2) - 2xi - 2yi^2 - 5 = 0$$
$$2(x^2 + 2xyi - y^2) - 2xi + 2y - 5 = 0$$
$$2x^2 + 4xyi - 2y^2 - 2xi + 2y - 5 = 0$$
$$2x^2 - 2y^2 + 2y - 5 + 4xyi - 2xi = 0$$
$$(2x^2 - 2y^2 + 2y - 5) + (4xy - 2x)i = 0$$

IMAGINARY PART

$$4xy - 2x = 0$$
$$2x(2y-1) = 0$$
$$2x = 0 \quad , \quad 2y - 1 = 0$$
$$x = 0 \quad , \quad 2y = 1$$
$$\boxed{x = 0,} \quad \boxed{y = \tfrac{1}{2}}$$

REAL PART

if $x = 0$

$$-2y^2 + 2y - 5 = 0$$
$$2y^2 - 2y + 5 = 0$$
$$\cancel{y^2 - y + 5/2 = 0}$$

Q # 5

find the limit

$$\lim_{z \to 8} \frac{2z^2 - 17z + 8}{8 - z}$$

$$\lim_{z \to 8} \frac{2z^2 - z - 16z + 8}{-(z - 8)}$$

$$\lim_{z \to 8} \frac{z(2z-1) - 8(2z-1)}{-(z-8)}$$

$$\cancel{\lim_{z \to 8} = \frac{(2z-1)(z-8)}{\quad}}$$

$$\lim_{z \to 8} = \frac{(2z-1)\cancel{(z-8)}}{-\cancel{(z-8)}}$$

$$\lim_{z \to 8} = \frac{2z-1}{-1}$$

Multiply & Divide By -1.

$$\lim_{z \to 8} = \frac{-1 \times (2z-1)}{-1 \times (-1)}$$

$$\lim_{z \to 8} = \frac{-2z+1}{1}$$

After Applying limit ($z \to 8$)

$$\lim_{z \to 8} = -2(8)+1$$

$$= -16+1 \Rightarrow -15$$

$$2z^2 - 2iz - 5 = 0$$

$$2(x+yi)^2 - 2i(x+yi) - 5 = 0$$

$$2(x^2 + y^2i^2 + 2xyi) - 2xi - 2yi^2 - 5 = 0$$

$$\cancel{2x^2 + 2y^2i^2}$$

$$2(x^2 - y^2 + 2xyi) - 2xi + 2y - 5 = 0$$

$$2x^2 - 2y^2 + 4xyi - 2xi + 2y - 5 = 0$$

$$2x^2 - 2y^2 + 2y - 5 + 4xyi - 2xi = 0$$

$$(2x^2 - 2y^2 + 2y - 5) + (4xy - 2x)i = 0$$

if ~~furthy~~

Real Part

$$2x^2 + 2y^2 + 2y - 5 = 0$$

$$2x^2 + 2y + 2y^2 = 5$$

$2y^2$ if

imaginary Part

$$4xy - 2x = 0$$

$$\cancel{4xy - 2x = 0}$$

$$\frac{4xy}{2} = \frac{+2x}{2}$$

$$2xy = x$$

Q#6 (b)

$$g(x) = x^2 . \ln x$$

$$\frac{d}{dx} g(x) = (x^2)\left(\frac{d}{dx}(\ln x)\right) + \left(\frac{d}{dx} x^2\right)(\ln x)$$

$$" = (x^2)\left(\frac{1}{x}\right) + 2x \ln x$$

$$g'(x) = x + 2x \ln x$$

Q#6 (A)

$$f(x) = (\ln x)^4$$

Let $u = \ln x$

$$f(x) \Rightarrow \frac{du}{dx} = \frac{1}{x}$$

$$\frac{d f(x)}{du} = \frac{d u^4}{du}$$

$$\frac{d f(x)}{du} = 4u^3$$

$$\frac{d f(x)}{dx} = \frac{d f(x)}{du} \times \frac{du}{dx}$$

Putting Values

$$\frac{d f(x)}{dx} = 4u^3 \times \frac{1}{x} \Rightarrow \frac{4(\ln x)^3}{x}$$