NAME: HASSAN KAMAL

ID#: 12925

SUBJECT NAME:
MULTIVARIATED CALCULUS

QUESTION#1:

If $(x + yi) / i = (7 + 9i)$ where x and y are real, what is the value of $(x + yi)(x - yi)$?

ANSWER:

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

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

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

$= 81 + 49$

$= 130$

QUESTION#2:

Find the values of x and y in the following equation, given further that $x \in R$, $y \in R$.

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

ANSWER:

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

$2x-(x)i+(2y)i-i2y=3-i$

$\underline{2x+y+(2y-x)i}=3-i$

Real imaginary
Comparing the real & imaginary parts,
$2x+y=3$--------------------------(1)

$2y-x=-1$----------------------------(2)
Solving eq(1) & eq(2),
$4x+2y=6$
$-3x+2y=-3$
$x=9$
$y=-15$
$\therefore(x,y)=(9,-15)$

QUESTION#3:

Solve the equation $2z^2 - 2iz - 5 = 0$, $z \in C$.

ANSWER:

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

$$x = \frac{-(-2i) \pm \sqrt{(-2i)^2 - 4(1)(-5)}}{2(1)}$$

$$x = \frac{2\text{i} \pm \sqrt{4i^2 + 20}}{2}$$

$$x = \frac{2\text{i} \pm \sqrt{-4 \quad + 20}}{2}$$

$$x = \frac{2\text{i} \pm \sqrt{16}}{2}$$

$$x = \frac{2\text{i} \pm 4}{2}$$

$$x = \frac{\text{i} \pm 2}{}$$

QUESTION#4:

Express 4 - $\sqrt{5}i$ in polar form.

ANSWER:

Polar form: (r,0)

a+bi

a=4

b=-$\sqrt{5}i$

r= $\sqrt{a2 +b2}$

= $\sqrt{16+5}$

= $\sqrt{21}$

Tan=($\sqrt{5}i$ /4)=tan(1)=pie/4

($\sqrt{21}$,pie/4)

QUESTION#5:

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

ANSWER:

2z2-17z+8/8-z

Limz_8

2(8)2-17(8)+8/8-8

128-136+8/0

0/0

0 answer

QUESTION#6:

Differentiate

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

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

ANSWER:

(i) dydx=4(lnx)3x

Explanation:

differentiate using the chain rule

given y=f(g(x)) then

dydx=f'(g(x))×g'(x)← chain rule

y=(lnx)4

⇒dydx=4(lnx)3×ddx(lnx)

=4(lnx)3x

(ii) If you are studying math’s, then you should learn the Product Rule for Differentiation, and practice how to use it:

ddx(uv)=udvdx+dudxv, or, (uv)'=(du)v+u(dv)

I was taught to remember the rule in words; "*The first times the derivative of the second plus the derivative of the first times the second* ".

This can be extended to three products:

ddx(uvw)=uvdwdx+udvdxw+dudxvw

So, with f(x)=x2lnx we have;

{Let u=x2==⇒dudx=2x'And v=lnx==⇒dvdx=1x'

ddx(uv)=udvdx+dudxv
ddx(x2lnx) =(x2) (1x)+(2x)(lnx)
ddx(x2lnx)=x+2xlnx