

MTH304

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1. Find the two roots of the function  $(z^2 - 2z + 2 = 0)$

$$(z = 1 \pm 2i)$$

--->>  $(z = 1 \pm i)$

$$(z = 2 \pm i)$$

$$(z = 3 \pm 2i)$$

2. Find the sum of the series  $(\sum_{n=0}^{\infty} \frac{n+1}{2^n})$

1

2

3

--->> 4

3. Simplify  $(\frac{1+2i}{3-4i} - \frac{2-i}{5i})$

$$(\frac{2i}{5})$$

--->>  $(-\frac{2}{5})$

$$(\frac{i}{5})$$

$$(-\frac{2i}{5})$$

4. If  $(f(z) = z^4 - 2z^3 + z^2 - 12z + 20)$  and C is the circle  $(|z|=5)$ , evaluate  $(\oint_C \frac{z f'(z)}{f(z)} dz)$

$$(2\pi i)$$

$$(3\pi i)$$

--->>  $(4\pi i)$

$$(-4\pi i)$$

5. Find the second term in the Laurent expansion of  $(f(z) = \frac{1}{z-3})$  valid for  $(|z| < 3)$

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$$\left(\frac{1}{5}z\right)$$

$$\rightarrow \left(-\frac{1}{9}z\right)$$

$$\left(-\frac{1}{9}z^2\right)$$

6. Find the first term in the expansion of  $f(z) = \sin z$  in a Taylor series about  $z = \frac{\pi}{4}$

$$\rightarrow \frac{\sqrt{2}}{2}$$

$$\sqrt{2}$$

$$\frac{\sqrt{3}}{2}$$

$$\frac{1}{2}$$

7. Find the square root of  $(2i)$  and express in rectangular coordinates.

$$(1 \pm i)$$

$$\sqrt{3} \pm 2i$$

$$\rightarrow (\pm(1 + i))$$

$$(\pm(1 - i))$$

8. Write the complex number  $(-1 - i)$  in exponential form.

$$\sqrt{2}e^{i\frac{3\pi}{4}}$$

$$-\sqrt{2}e^{i\frac{3\pi}{4}}$$

$$\sqrt{3}e^{i\frac{\pi}{4}}$$

$$\rightarrow \sqrt{2}e^{-i\frac{3\pi}{4}}$$

9. Find the region of convergence of the series  $\sum_{n=1}^{\infty} n! z^n$

$$(0)$$

$$1$$

$$\rightarrow (-\infty)$$

$$(-1)$$

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--->  $\frac{3\pi}{4}$

$\frac{3\pi}{4}$

$\frac{3\pi}{2}$

$\pi$

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