18MAB102T-Surprise Test 5-July 24

* Required

Answer ALL Questions

Each question carries ONE mark.

1 *

If $f(z)$ is analytic and $f'(z)$ is continuous at all points inside and on a simple closed curve C, then by Cauchy's integral theorem $\int_C f(z)\, dz =$

(A) 0	(B) $2\pi i$
(C) $-2\pi i$	(D) 1

- (●) A
- ( ) B
- ( ) C
- ( ) D

2 *

If $f(z)$ is analytic inside and on C, then the value of $\oint_C \frac{f(z)}{z-a}\,dz$, where C is a simple closed curve and 'a' is any point within C is

(A) 0	(B) $2\pi i\, f(a)$
(C) $-2\pi i\, f(a)$	(D) 1

- [ ] A
- [x] B
- [ ] C
- [ ] D

3 *

If $f(z)$ is analytic inside and on C, then the value of $\oint_C \frac{f(z)}{(z-a)^{n+1}}\,dz$, where C is a simple closed curve and 'a' is any point within C is

(A) 0	(B) $\frac{2\pi i}{n\,!}\, f^{n}(a)$
(C) $-\frac{2\pi i}{n\,!}\, f^{n+1}(a)$	(D) $\frac{2\pi i}{n\,!}\, f^{n+1}(a)$

- [ ] A
- [x] B
- [ ] C
- [ ] D

4 *

If $f(z)$ is analytic at all points inside and on a simple closed curve C except for a finite number of isolated singular points $z_1, z_2, \ldots, z_n$ within C, then by Cauchy's residue theorem $\oint_C f(z)\,dz =$	
(A) 0	(B) $2\pi i \times$ Sum of residues of $f(z)$ at $z_1, z_2, \ldots, z_n$
(C) 1	(D) $-2\pi i \times$ Sum of residues of $f(z)$ at $z_1, z_2, \ldots, z_n$

- ○ A
- ◉ B
- ○ C
- ○ D

5 *

If $z = z_0$ is a simple pole, then the residue of $f(z)$ is

(A) $\operatorname{Res}[f(z), z_0] = \lim_{z \to z_0} (z - z_0)\, f'(z)$

(B) $\operatorname{Res}[f(z), z_0] = \lim_{z \to z_0} f'(z)$

(C) $\operatorname{Res}[f(z), z_0] = \lim_{z \to z_0} f(z)$

(D) $\operatorname{Res}[f(z), z_0] = \lim_{z \to z_0} (z - z_0)\, f(z)$

- ○ A
- ○ B
- ○ C
- ◉ D

6 *

The singular points of $f(z)=\dfrac{z+3}{(z+1)(z+2)}$ are

(A) $z = 1, 3$ (B) $z = 1, 0$

(C) $z = -1, -2$ (D) $z = 2, 3$

- A
- B
- C
- D

7 *

If $f(z)$ is analytic at all points inside a circle C, with centre at 'a' and radius R, then Taylor's series expansion of $f(z)$ is

(A) $f(z)=1+\dfrac{(z-a)}{1!}f'(a)+\dfrac{(z-a)^2}{2!}f''(a)+\ldots$

(B) $f(z)=\dfrac{(z-a)}{1!}f'(a)+\dfrac{(z-a)^2}{2!}f''(a)+\ldots$

(C) $f(z)=f(a)+\dfrac{(z-a)}{1!}f'(a)+\dfrac{(z-a)^2}{2!}f''(a)+\ldots$

(D) $f(z)=f(a)-\dfrac{(z-a)}{1!}f'(a)+\dfrac{(z-a)^2}{2!}f''(a)-\ldots$

- A
- B
- C
- D

8 *

A zero of an analytic function $f(z)$ is a value of z for which

(A) $f(z) = 1$	(B) $f(z) \neq 1$
(C) $f(z) \neq 0$	(D) $f(z) = 0$

- ○ A
- ○ B
- ○ C
- ◉ D

9 *

The value of $\oint_C \frac{\cos z}{z-3} dz$ where C is a circle $|z-1| = 1$ is

(A) 0	(B) 1
(C) e	(D) $2\pi i$

- ◉ A
- ○ B
- ○ C
- ○ D

10 *

The value of $\oint_C \frac{dz}{z+2}$ where C is the circle $\|z\| = 2$ is
(A) 0 (B) $2\pi i$
(C) $-2\pi i$ (D) πi

- A
- B
- C
- D

Send me a copy of my responses.

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