

# Unit 3 - Introduction to complex variables

## Course outline

### How to access the portal?

#### Week0

#### Introduction to complex variables

- Introduction to complex variables.
- Cauchy Riemann Equations.
- Analytic Functions.
- Simple definitions
- Definition of sets, domains, theorem on antiderivative.
- Cauchy Goursat Theorem.

#### Quiz : Week1 Assessment

#### Week1 Assessment Solutions

#### Important theorems in complex variables

#### Branch cuts of the square root function

#### The inverse Laplace transform

## Week1 Assessment

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2019-08-14, 23:59 IST.**

1)  $(1 + i)^8$  is equal to

1 point

- $-16e^{i\pi}$   
  $-16e^{i\pi/2}$   
  $16e^{i\pi}$   
  $16e^{i\pi/2}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $-16e^{i\pi}$

2)  $\tan(z)$  is equal to

1 point

- $\frac{e^{iz} + e^{-iz}}{e^{iz} - e^{-iz}}$   
  $\frac{e^{iz} - e^{-iz}}{e^{iz} + e^{-iz}}$   
  $\frac{e^z - e^{-z}}{e^z + e^{-z}}$   
 None of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
None of the above

3)  $\frac{2+6i}{1+2i}$  is equal to

1 point

- $(14 - 2i)/5$   
  $(14 + 2i)/5$   
  $-(14 - 2i)/5$   
  $-(14 + 2i)/5$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $(14 + 2i)/5$

4) The order of the pole of the function  $\frac{\sin(z)}{z^n}$  is (for  $n \neq 0$ )

1 point

- $n - 3$   
  $n - 2$   
  $n - 1$   
  $n$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $n - 1$

5) The order of the pole of the function  $\frac{\sin(z) - \cos(z)}{z^n}$  is (for  $n \neq 0$ )

1 point

- $n - 3$   
  $n - 2$   
  $n - 1$   
  $n$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $n$

6)  $\lim_{z \rightarrow 0} \frac{e^{iz} - e^{-iz}}{z}$  is equal to

1 point

- $2i$   
  $2$   
  $i$   
  $1$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $2i$

7) The value of  $(1 - i)^n(1 - \frac{1}{i})^n$  is equal to

1 point

- $i^n$   
  $(2i)^n$   
  $1$   
  $2^n$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $2^n$

8) If  $(1 + i)z = (1 - i)\bar{z}$  then  $z$  is equal to  
(Note that  $\bar{z}$  is the conjugate of  $z$ )

1 point

- $z = -\bar{z}$   
  $z = -i\bar{z}$   
  $z = \bar{z}$   
  $z = i\bar{z}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $z = -i\bar{z}$

9) If  $|z| = z + 1 + 2i$ , where  $z = a + ib$  and  $|z|$  is the modulus of  $z$ , then the values for  $a$  and  $b$  are

1 point

- $a = 3/2, b = -2$   
  $a = -3/2, b = -2$   
  $a = 5/2, b = 2$   
  $a = -5/2, b = 2$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $a = 3/2, b = -2$

10) Consider  $|z| = 1$ , and  $z \neq -1$ , where  $|z|$  is the modulus of  $z$ .

1 point

Find the values for  $a$  and  $b$  where  $a + ib = \frac{z-1}{z+1}$ .

(Note that  $Re(z)$  is the real part and  $Im(z)$  is the imaginary part of  $z$ )

- $a = 0, b = \frac{Im(z)}{1+Re(z)}$   
  $a = \frac{Re(z)}{1+Re(z)}, b = 0$   
  $a = \frac{Im(z)}{1+Re(z)}, b = \frac{Re(z)}{1+Re(z)}$   
  $a = \frac{1}{1+Re(z)}, b = 0$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $a = 0, b = \frac{Im(z)}{1+Re(z)}$