**Limits Continuity and Differentiability**

**MCQ-Single Correct**

1. If for , the derivative of  is . g(x), then g(x) equals :

(1)  (2) 

(3)  (4)  **[2017]**

2.  equals :

(1)  (2) 

(3)  (4)  **[2017]**

3. Let  then log p is equal to :

(1) 1 (2) ½

(3) ¼ (4) 2 **[2016]**

4. For , and g(x) = f(f(x)), then :

(1) g’(0) = cos(log2)

(2) g’(0) = -cos(log2)

(3) g is differentiable at x = 0 and g’(0) = - sin(log2)

(4) g is not differentiable at x = 0 **[2016]**

5.  is equal to :

(1) 3 (2) 2

(3) ½ (4) 4 **[2015]**

6. If the function, g(x) =  is differentiable, then the value of k + m is :

(1) 16/5 (2) 10/3

(3) 4 (4) 2 **[2015]**

7.  is equal to

(1)  (2) 1

(3) - π (4) π **[2014]**

8. If , then  at x = 1 is equal to

(1) ½ (2) 1

(3)  (4)  **[2013]**

9.  is equal to :

(1) 1/2 (2) 1

(3) 2 (4) -1/4 **[2013]**

10. Let f: be such that exists and , then  equals

(1) 2 (2) 3

(3) 0 (4) 1 **[2011]**

11. If function f(x) is differentiable at x = a, then  is

(1)  (2) 

(3)  (4)  **[2011]**

12. Let f : be a positive increasing function with . Then 

(1) 2/3 (2) 3/2

(3) 3 (4) 1 **[2010]**

13. Let f : be a differentiable function with f(0) = -1 and f’(0) =1. Let . Then g’(0) =

(1) -4 (2) 0

(3) -2 (4) 4 **[2010]**

14. Let y be an implicit function of x defined by . Then y’(1) equals

(1) -1 (2) 1

(3) log 2 (4) - log 2 **[2009]**

15. Let f(x) =  . Then which one of the following is true?

(1) f is neither differentiable at x = 0 nor at x = 1

(2) f is differentiable at x = 0 and at x = 1

(3) f is differentiable at x = 0 but not at x = 1

(4) f is differentiable at x = 1 but not at x = 0 **[2008]**

16. The set of points where  is differentiable is

(1) 

(2) 

(3) 

(4)  **[2006]**

17. If , then  is

(1)  (2) 

(3) xy (4)  **[2006]**

18. Let and be the distant roots of , then  is equal to

(1)  (2) 0

(3)  (4)  **[2005]**

19. Suppose f(x) is differentiable x = 1 and  then f’(1) equals

(1) 3 (2) 4

(3) 5 (4) 6 **[2005]**

20. Let f be differentiable for all x. If f(1) = -2 and  for , then

(1)  (2) 

(3) f(6) < 5 (4) f(6) = 5 **[2005]**

21. If f is a real-valued differentiable function satisfying  , x , y ε R and f(0) = 0 , then f(1) equals

(1) -1 (2) 0

(3) 2 (4) 1 **[2005]**

22. If , then the values of a and b, are

(1)  (2) a = 1, 

(3)  (4) a = 1 and b = 2 **[2004]**

23. Let  ,  , . If f(x) is continuous in , then  is

(1) 1 (2) ½

(3) -1/2 (4) -1 **[2004]**

24. If , x > 0 , then  is

(1)  (2) 

(3)  (4)  **[2004]**

25.  is

(1) 1/8 (2) 0

(3) 1/32 (4)  **[2003]**

26. If , the value of k is

(1) 0 (2) -1/3

(3) 2/3 (4) -2/3 **[2003]**

27. Let f (a) = g(a) = k and their  derivatives , exist and are not equal for some n.

Further if  then the value of k is

1. 4 (2) 2

(3) 1 (4) 0 **[2003]**

28. If f(x) = 

then f(x) is

1. Continuous as well as differentiable for all x
2. Continuous for all x but not differentiable at x = 0
3. Neither differentiable nor continuous at x = 0
4. Discontinuous everywhere **[2003]**

29. 

is

(1)  (2) zero

(3)  (4)  **[2003]**

30. , , ([x] denotes greatest integer less than or equal to x)

(1) has value -1 (2) has value 0

(3) has value 1 (4) does not exist **[2002]**

31.  is

(1)  (2) 

(3)  (4)  **[2002]**

32. f is defined in [-5,5] as f(x) = x, if x is rational and = -x, if x is irrational. Then

(1) f(x) is continuous at every x, except x = 0

(2) f(x) is discontinuous at every x, except x = 0

(3) f(x) is continuous everywhere

(4) f(x) is discontinuous everywhere

33. If , then  is

(1)  (2) 

(3) - y (4)  **[2002]**

34. If f(1) = 1, f’(1) = 2, then  is

(1) 2 (2) 4

(3) 1 (4) ½ **[2002]**

35.  is

(1) 1 (2) -1

(3) 0 (4) does not exist **[2002]**

36. 

(1)  (2) 

(3)  (4) 1 **[2002]**

37. Let f(x) = 4 and f’(x) = 4 , then  equals

(1) 2 (2) -2

(3) -4 (4) 3 **[2002]**

**Assertion – Reason Type**

1. Define F (x) as the product of two real functions ,  and **[2011]**

 as follows

F (x) = 

**Statement-I :** F(x) is continuous on R

**Statement-II** :  and are continuous on R

2. Let be a continuous function defined by , **[2010]**

**Statement-I : ,** for some 

**Statement-II : ,** for all 

3. Let f(x) = x|x| and g(x) = sin x **[2009]**

**Statement-I** : gof is differentiable at x = 0 and its derivative is continuous at that point.

**Statement-II** : gof is twice differentiable at x = 0.