**MATHEMATICS**

**PAGEMAKER10**

**DEFINITE INTEGRAL**

Q1. If , then  is equal to

(a) log 2

(b) log 4

(c) log 8

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q2. The value of is equal to

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q3. Which of the following is incorrect?

(a)

(b)

(c)

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q4. The value of the integral for is

(a) 0

(b)

(c)

(d) 2

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q5. The value of the integral  is

(a) 0

(b) log 7

(c) 5 log 13

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q6. is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q7. is equal to

(a) 0

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q8. is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q9. If and then the value of is

(a) 2

(b)

(c)

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q10. If then

(a)

(b)

(c) 0<

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q11. If

= , then the value of

is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q12. The value of the integral is equal to

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q13. The value of is

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q14. The value of the integral must be

(a)

(b)

(c)

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q15. The value of  is

(a)

(b)

(c)

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q16. If satisfies the condition of Rolle’s theorem in [1, 2], then is equal to

(a) 1

(b) 3

(c) 0

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q17. The value of the integral

is equal to

(a)

(b) 2

(c) 4

(d) None of these

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q18. If is a polynomial of the least degree that has a maximum equal to 6 at and a minimum equal to 2 at then equals

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q19. The numbers of possible continuous defined in [0, 1] for which is/are

(a) 1

(b)

(c) 2

(d) 0

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

Q20. The value of the definite integralis

(a)

(b)

(c)

(d)

L1Difficulty1

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (b)

Sol.



= 

=

Put



=

=

S2. Ans. (c)

Sol.





= 

Put

= =

S3. Ans. (d)

Sol.

 putting

we get

Putting

we get

=

=

=

as is even and is odd.

S4. Ans. (a)

Sol.

=

=

=

S5. Ans. (a)

Sol.



Let



=

S6. Ans. (c)

Sol.

Put

When

given integral

=

Also,

=

S7. Ans. (b)

Sol.

=

=

=

=

S8. Ans. (a)

Sol.

Let (1)

= 

=  (2)

Adding equations (1) and (2) gives



=

Put therefore

When



=

=

=

S9. Ans. (c)

Sol.

We have 



Now,



==

S10. Ans. (c)

Sol.

We have

where

(1)

Since, is an increasing function for therefore, when

(2)

From equations (1) and (2), we find that L.H.S. of equation (1) is positive and lies between 1 and . Therefore, is a positive real number.

Now, from equation (1), (3)

The denominator of equation (3) is greater than unity and the numerator lies between 0 and 1. Therefore,

S11. Ans. (a)

Sol.

Putting we get

S12. Ans. (c)

Sol.

Given integral

=

=

=

=

=

=

=

S13. Ans. (d)

Sol.

=

=

S14. Ans. (b)

Sol.

On putting we get

Integral (without limits) =

= =

= where

=

=

Definite integral =

=

S15. Ans. (a)

Sol.

log

= 

Put

If and

Put



S16. Ans. (c)

Sol.

As satisfies the conditions of Rolle’s theorem in [1, 2], is continuous in the interval and

Therefore,

S17. Ans. (a)

Sol.

=

+

=

=

=

S18. Ans. (c)

Sol.

The polynomial function is differentiable everywhere. Therefore, the points of extremum can only be the roots of the derivative. Further, the derivative of a polynomial is a polynomial. The polynomial of the least degree with roots and has the form

Hence,

Since at we must have we have

=

Also, so Hence,

Thus,

S19. Ans. (d)

Sol.

Since

Hence, no such positive function

S20. Ans. (b)

Sol.





Adding equations (1) and (2), we get



= 

= 

=  (where

= 

**LEVEL-II**

Q1. Suppose that is an anti-derivative of , where then  can be expressed as

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q2. If then is equal to

(a) 1

(b) 2

(c) 3

(d) 4

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q3. The value of the integral  is

(a) 0

(b) 1

(c) 2

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q4.  is equal to (where

(a) 2

(b) 2

(c) 2

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q5. The value of the integral lies in the interval

(a)

(b)

(c) )

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q6. then

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q7. If then

(a)

(b)

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q8. If is continuous for all real values of then  is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q9. then

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q10. If and are continuous functions, the is

(a) dependent on

(b) a non-zero constant

(c) zero

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q11. is equal to

(a)

(b)

(c) 0

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q12. and is bounded. If 



(where then is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q13. If for then

(a)

(b)

(c) is continuous and differentiable in

(d) is continuous but not differentiable in

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q14. If  then the value of is

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q15.  is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q16. log is equal to

(a)

(b) 0

(c)

(d) None of these

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q17. If then the value of the integralis

(a)

(b)

(c) 1

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q18. Let and then is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q19. If then the value of the integral is

(a) 2

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

Q20. is equal to

(a)

(b)

(c)

(d)

L3Difficulty3

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (a)

Sol.

Let

Put

But given

S2. Ans. (b)

Sol.

=

=

=

=

= 2

S3. Ans. (a)

Sol.

Let

Putting

(1)

Replacing by or we get

=  (2)

Adding equations (1) and (2), we get



S4. Ans. (a)

Sol.

function is symmetric about the line



S5. Ans. (c)

Sol.

Since is an increasing function on , therefore and are minimum and maximum values of in the interval

for all





S6. Ans. (a)

Sol.

=

=

=

=

Putting i.e., we get

=

S7. Ans. (c)

Sol.

= 

=

Also 

= 

=

2

S8. Ans. (a)

Sol.



= 



=…



S9. Ans. (c)

Sol.

=

=

as is odd.

=

=

S10. Ans. (c)

Sol.

= 

(as function inside the integration is odd)

S11. Ans. (b)

Sol.

S12. Ans. (c)

Sol.



S13. Ans. (c)

Sol.

 (1)

Replacing by and then adding with equation (1).



= 

= 

Let



= 

=

=

S14. Ans. (c)

Sol.



Putting we get



= 

Adding, we get 



S15. Ans. (a)

Sol.

For



S16. Ans. (a)

Sol.



=

= 

S17. Ans. (d)

Sol.



=  (Integrating by parts)

=

=

Now

S18. Ans. (c)

Sol.

=, 

In put



= =

S19. Ans. (d)

Sol.

Put

i.e.,

When

When

=

S20. Ans. (d)

Sol.

Putting

=

Putting i.e.,

we get

=

**LEVEL-III**

Q1. If (where then equals

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q2. If then

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q3. The value of is,

(a)

(b) 0

(c)

(d) 2

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q4. The value of the definite integralis

(a) 0

(b)

(c)

(d) 2

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q5. If  then is equal to

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q6. Given  If then the values of and are

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q7. Let min where denotes the fractional part of , then is equal to

(a) 50

(b) 100

(c) 200

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q8. equals (where is a fractional part of )

(a) 13

(b) 6.3

(c) 1.5

(d) 7.5

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q9. The value of where where denotes the greatest integer not exceeding is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q10. The value of and is equal to (where represents greatest integer function

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q11. If then is equal to

(a) 0

(b)

(c) 1

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q12. Let  and be the inverse of . Then the value of (0) is

(a) 1

(b) 17

(c)

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q13. The value of the definite integral equals

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q14. If then is equal to

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q15. If then is equal to

(a)

(b)

(c)

(d) 0

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q16. A function is continuous for all (and not every where zero) such that then is

(a)

(b)

(c)

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q17.  is equal to

(a)

(b)

(c) 0

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q18. where Then the complete set of values of for which is

(a)

(b)

(c)

(d) None of these

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q19. If then the value of is

(a) 1/2

(b) 0

(c) 1

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

Q20. If then the value of is denotes the greatest integer function)

(a) 4

(b) 5

(c) 6

(d)

L5Difficulty5

Qtag Mathematics

Qcreator Pagemaker10

**Solutions**

S1. Ans. (a)

Sol.

=

=

=

S2. Ans. (c)

Sol.

Putting

we get

=

=

Since,

Therefore,

S3. Ans. (c)

Sol.

We have

d for all

S4. Ans. (b)

Sol.

= 0

S5. Ans. (a)

Sol.

=

=

=

= 6

= 6

=

S6. Ans. (b)

Sol.



 (integrating by parts)

 (1)

Replacing by

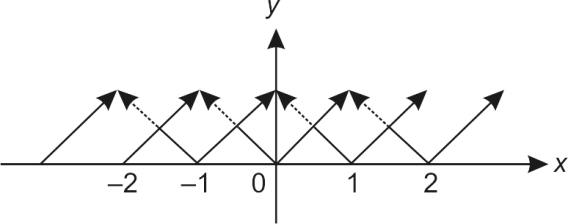
(2)

From equations (1) and (2), we have

and

S7. Ans. (a)

Sol.



The graph with solid line is the graph of and the graph with dotted lines is the graph of Now the graph of min({x}) is the graph with dark solid lines.

= area of 200 triangles shown as solid dark lines in the diagram = 200

S8. Ans. (c)

Sol.

Put

=

S9. Ans. (b)

Sol.

Let

Let where and

+…+

=

+

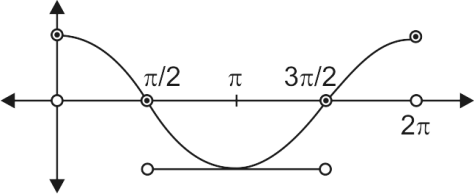
d

S10. Ans. (c)

Sol.

=

=

****

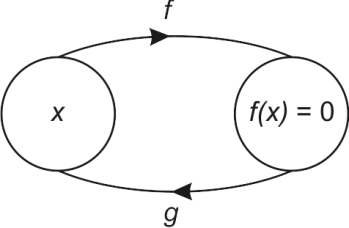
S11. Ans. (a)

Sol.

= 

S12. Ans. (c)

Sol.

****

Now

when i.e.,  then

Hence,

S13. Ans. (b)

Sol.

(1)

=

(2)

Adding equations (1) and (2), we get

S14. Ans. (c)

Sol.

and

S15. Ans. (a)

Sol.

d

S16. Ans. (c)

Sol.

(differentiating w.r.t.

using Leibnitz rule)

as is not zero everywhere]

Put we have or

S17. Ans. (a)

Sol.



Apply L’Hopital Rule



S18. Ans. (a)

Sol.

and

Let

is increasing for

and

S19. Ans. (a)

Sol.



=

[using Leibnitz’s Rule]

S20. Ans. (b)

Sol.

Differentiating both sides w.r.t.

Now is attained when