**Integral Calculus**

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**1 Definition**

Let and be two functions involving x, such that

then is the anti – derivative of with respect to x.

Symbolically,

**2 Fundamentals**

**2.1 Formulas**

Since,

Now, we will be looking at some basic integration formulas.

An Exerpt:

**2.2 Some Important Points**

* , the first and the second functions are chosen as Inverse Logarithmic Algebraic Trigonometric Exponential.

AID TO MEMORY

First function as it is

into

integration of the second

minus

integration of differential coefficient of the first function

into

integration of the second

* When there are bounds in an Integration, it is said to be definite in nature. It is denoted as . It is evaluated as
* , where

**2.3 Geometrical Interpretation**

Let we have a curve,

****

is the area under the curve, bounded by the lines.

**2.4 Some Daily Life Applications**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Function* | *Derivative* | *In Symbols* | *Function* | *Integral* | *In Symbols* |
| *Displacement(x)* | *Velocity(v)* |  | *Velocity(v)* | *Displacement(x)* |  |
| *Velocity(v)* | *Acceleration(a)* |  | *Acceleration(a)* | *Velocity(v)* |  |
| *Mass(m)* | *Linear Density()* |  | *Linear Density()* | *Mass(m)* |  |
| *Population(P)* | *Instantaneous Growth()* |  | *Instantaneous Growth()* | *Population(P)* |  |
| *Cost(C)* | *Marginal Cost()* |  | *Marginal Cost()* | *Cost(C)* |  |
| *Revenue(R)* | *Marginal Revenue()* |  | *Marginal Revenue()* | *Revenue(R)* |  |

Question 1: Evaluate

Solution:

We know,

So,

Question 2: Evaluate

Solution:

We know,

Question 3: Evaluate

Solution:

We know, and

Let and

Question 4: Evaluate

Solution:

We know,

Question 5: Evaluate

Solution:

We know,

Let

Differentiating both sides w.r.t

Multiplying Numerator and Denominator by



According to Question

We know,

Question 6: Evaluate

Solution:

Let

Differentiating both sides w.r.t

Let and

Let

Differentiating both sides w.r.t

Question 7: Evaluate

Solution:

Let

Differentiating both sides w.r.t to



Question 8: Evaluate

Solution:

Let

Differentiating both sides w.r.t to

Question 9: Evaluate

Solution:

Let

Differentiating both sides w.r.t to

Question 10: Evaluate

Solution:

Now,

Case 1:

Case 2:

Question 11: Given . Evaluate

Solution:

Question 12: Evaluate

Solution:

Let

Differentiating both sides w.r.t to

Question 13: Evaluate

Solution:

Let and

Let

Differentiating both sides w.r.t to

and

Question 14: Evaluate

Solution:

We know,

Now,

Let and

Let

Differentiating both sides w.r.t to

Let

Differentiating both sides w.r.t to

Question 15: Evaluate

Solution:

We know,

Now,

Let and

Let

Differentiating both sides w.r.t to

Let

Differentiating both sides w.r.t to

Question 16: Evaluate

Solution:

We know,

Now,

Let and

Let

Differentiating both sides w.r.t to

Let

Differentiating both sides w.r.t to

Question 17: Evaluate

Solution:

Question 18: Evaluate

Solution:

Here, is the variable but is the constant.

Let

Let

*.*

*.*

*.*

So,

This is continued till

So,

Question 19: Evaluate

Solution:

We know,

Let and

Let

Differentiating both sides w.r.t to

Question 20: Evaluate

Solution:

We know,

Question 21: Evaluate

Solution:

We know,

Question 22: Evaluate

Solution:

We know,

Question 23: Evaluate

Solution:

We know,

Question 24: Evaluate

Solution:



Let

Differentiating both sides w.r.t to

Question 25: Evaluate

Solution:



Let

Differentiating both sides w.r.t to

Question 26: Evaluate

Solution:



Let

Differentiating both sides w.r.t to

Question 27: Evaluate

Solution:



Let

Comparing, we get

and

and

and

Further, on solving by substituting the values of and , we can get the

We know,

Question 28: Evaluate

Solution:



Let

Comparing, we get

and

and

and

Further, on solving by substituting the values of and , we can get the

We know,

Question 29: Evaluate

Solution:



Let

Comparing, we get

and

and

and

Further, on solving by substituting the values of and , we can get the

We know,

Question 30: Evaluate

Solution:



Let,

Comparing, we get

and

and

Let and

Let

Differentiating both sides w.r.t

Let

Differentiating both sides w.r.t

Question 31: Evaluate

Solution:



Let,

Comparing, we get

, , and

, , and

, , and

We know,

Question 32: Evaluate

Solution:



Let,

Comparing, we get

, , and

, , and

, , and

We know,

Question 33: Evaluate

Solution:



Let,

Comparing, we get

, , and

, , and

, , and

We know,

Let

Differentiating both sides w.r.t

Let

Differentiating both sides w.r.t

Let

Let

So,

So,

As

As

Question 34: Evaluate

Solution:

