INTEGRATION TOPICS

1. Indefinite and Definite integrals (anti derivatives)

2. Trigonometric integration

3. Exponential Integration

REVIEW OF TRIGONOMETRIC IDENTITIES

SOME DIFFERENTIATION AND INTEGRALS

d/dx (x rsup n) = n{x rsup {n-1}} => int {x^ndx} = {x ^ {n+1}} over {n+1} + c

d/dx lnx = 1/x => int {1/x dx} = ln x + c

d/dx e^x =e^x => int {e^x dx} = e^x + c

d/dx e^kx = ke^kx => int {e^kx} = e^kx/k + c

d/dx a^x = a^xln a => int {a^x dx} = a^x/lna + c

Integration. This can be seen as the anti derivatives of something.

Take a look at the power rule of differentiation:

You’ll see that the power rule for integration will be

If we find the derivative of {x rsup 3}, it will be

Now, if we find the integral of , we will have

Example 2: Find the anti derivative of

Answer:

Example 3: Find the anti-derivative of

Answer:

Example 4:

Answer:

Example 5: The integral of 4

Example 6: Find

Answer:

DEFINITE INTEGRALS

The process by which we evaluate the anti derivatives comes from thew fundamental theorem of calculus.

A function represented with f(x) – small f – while the anti-derivative F(x) – capital F –

One of the theorems says, the integral from a to b of a function f(x) where this function is continuous on a closed interval [a, b] is given below.

You should note that

Example 7:

# The c will cancel out

EXPONENTIAL INTEGRATION

Recall that, given a function

For the anti-derivatives,

. This applies if and only if the function f(x) is a linear function like ax+b or something.

For example

Using another method (method of substitution)

**METHOD OF SUBSTITUTION**

Given this

We can say, let

Making dx the subject of the formula,

Looking at another example,

Let

Solve

Answer:

Using the u substitution

Typically you want to make “u” the stuff that is more complicated.

When using the substitution method, you want to make eliminate every value of x when you are substituting the u

Answer:

Answer:

Answer:

Answer:

Let u = sin (x). Answer:

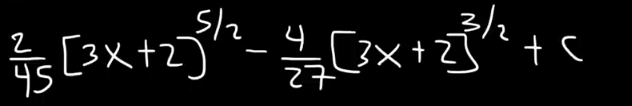
Answer:

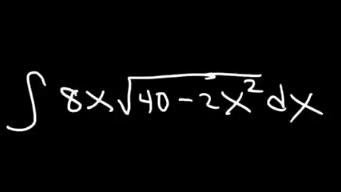
Let u = 3x + 2

If you do it the normal way, you’ll see that you’ll get a value like

And the value 3 won’t be able to cancel out the outstanding x.

So in this situation where it both expressions, they have the same power. That is in x and {3x + 2}, you’ll have to solve for x





INTEGRATION TO THE FORM

Let

But

INTEGRAL OF TAN X

Let u = cos x

Using substitution method,

After solving with substitution method we will have something like:

Find the integral of cot (x)

Let

Find the integral:

Typically, you will want to bring out a tan^2. This is because of the identity

Next we use the substitution method.

For the first 2, let u = tan (x)

Recall that

After solving sha, you should have an answer:

MORE ON TRIGONOMETRIC

int {sin x} = - cos x + c

int {cos x} = sin x + c

int {sec^2xdx} = tan x + c

Hyperbolic functions

int {sinh x dx} = cosh x + c

int {cosh x dx} = sinh x + c

d/dx sin ^ -1 x

TIPS TO SOLVING INTEGRAL QUESTIONS

1. Learn a lot of trigonometric identities.

2.

If n = odd and m = even,

We can say that n = 2k+1

From this point on, we can then decide to do the u-substitution with

u = sin x

3. A similar method can be applied if m is odd and n is even

For that, we are going to end up with something like:

4.

When m and n are even (m=n=even)

We will use the half-angle formula

5. If both are odd