

Calc II Cheat Sheet

by smithandrewa via cheatography.com/71791/cs/18986/

| Trig Integrals | |
|------------------------|----------------|
| ∫sinx dx | = -cosx dx + C |
| ∫cosx dx | = sinx dx + C |
| $\int \sec^2 x dx$ | = tanx dx + C |
| ∫tanx dx | = In secx + C |
| ∫secx tanx dx | = secx + C |
| ∫csc ² x dx | = -cotx + C |
| ∫cscx cotx dx | = -cscx + C |
| ∫cotx dx | = In sinx + C |

| Trig Identities | | |
|------------------------------|-----------------------------------|--|
| $\int (1/x^2 + a^2) dx$ | = 1/a tan ⁻¹ (x/a) + C | |
| $\int (1/Sqrt(a^2 - x^2) dx$ | $= \sin^{-1}(x/a) + C$ | |
| (While a > 0) | | |

Area Between Curves

Area = ∫[Height] Width

 $A = \int (f(x) - g(x)] dx$

1. Graph Equasions

2. Label

3. Determine how to slice

4. Set up dA

5. dA = height*dx

6. Get range a & b from inters ections

7. Plug in and find area

There is never (-) area.

Volume by Disk dV = A(x) dx $V = \int A(x) dx$ Volume = $\int Radius^2 * Thickness$

dV = A(x) dx $V = \int A(x) dx$

Volume = $\int [(pi r out^2) - (pi r in^2)] dx$

Slice Perpendicular to Axis of Rotation

$V = \int (pi(r)^2) dx$ Volume by Washer

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U-Substitution

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Volume by Shell

dVolume = Circumference * dArea

dV = (2 pi r) dArea

 $V = \int (2 \text{ pi r}) (Area) dx$

1. Write: dV = 2 pi r dA

2. Find dA(height dx)

3. Find Radius(x or y)

4. Plug in

5. Take integral

Slice Parallel to Axis of Rotation

Average Value of a Function

Average Value = 1/b-a * f(x) dxSymmetry: If f(x) is EVEN, then $\int f(x) dx$ from -a to a = $2 \int f(x)$ from 0 to a

If f(x) is ODD, then $\int f(x) dx$ from -a to a = 0

| Important Integrals | | |
|-------------------------|---------------------------------|--|
| ∫c f(x) dx | $= c \int f(x) dx$ | |
| $\int [f(x) + g(x)] dx$ | $= \int f(x) dx + \int g(x) dx$ | |
| $\int 1/x dx$ | $= \ln x + C$ | |
| $\int e^{x} dx$ | $= e^{X} + C$ | |
| $\int b^{x} dx$ | $= (b^X / lnb) + C$ | |

| Methods of Integration | | | | |
|----------------------------|--|--|--|--|
| Method | When to Use | Example | | |
| U-Substitution | When a Polynomial is raised to a power > 1 | $\int (3x + 5)^5$ | | |
| Integration by Parts | When U-Sub will not work | ∫xe ^x | | |
| Trigonometric Integration | Only Trig raised to powers | ∫sin ⁶ x cos ³ xdx | | |
| Trigonometric Substitution | $3/2$ powers or $Sqrt(a^2-x^2)$ etc. | $\frac{dx}{(x^2Sqrt(25-x^2))}$ | | |



By smithandrewa

cheatography.com/smithandrewa/



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Integration by Parts

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Logarithmic
Inverse trig
Algebraic
Trigon ometric
Expone ntial

\int dv = u v - \int v du

1. Write u v - \int v du

2. Use LIATE to find u; the other term becomes dV

3. Setup u= dV= du= V=

4. Solve
```

Cyclical Functions will need to be split and substituted.

Trigonometric Integration

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Identities

\sin^2 t + \cos^2 t = 1

\sin^2 t = 1/2 [1-\cos (2t)]

\cos^2 t = 1/2 [1+\cos (2t)]

Can use with U-Subs tit ution
```

Don't change all of the trig to the same form.

Trigonometric Integration

```
Identities

\sin^2 t + \cos^2 t = 1

\sin^2 t = 1/2 [1-cos (2t)]

\cos^2 t = 1/2 [1+cos (2t)]

Can use with U-Subs tit ution
```

Don't change all of the trig to the same form.

Trigonometric Substitution

```
Pythag. Identities

\sin^2 + \cos^2 = 1

1 + \tan^2 = \sec^2

1 + \cot^2 = \csc^2

1. Identify a and u

2. Sub in the trig

3. Manipulate to simplify

4. Get rid of trig with a triangle
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