Lasted edited: 2024-03-28

U of I MAC Handouts:

Integral Flow Chart

Does It Look Like... → Then Try This!

Basic Integrals:
Constants
Polynomials
Sine or Cosine
$\frac{1}{x}$
e^x

→ Check Integral Sheet

↓

Function and its Derivative:
xe^{x^2}
$sinxcos^4x$
$\frac{(lnx)^2}{x}$
$e^x sine^x$

→ Try a **U - sub**. Pick the most complex part to be U and cancel out a simpler part in the substitution.

↓

Trigonometric Functions:
sin(x), csc(x)
cos(x), sec(x)
tan(x), cot(x)

→ Look for **trig identities** that would simplify:
$sin^2x + cos^2x = 1$
$sin^2x = \frac{1}{2}(1 - cos2x)$
$cos^2x = \frac{1}{2}(1 + cos2x)$
$sin2x = 2sinxcosx$

↓

udv Form:
Two functions multiplied together, one which you can repeatedly differentiate and one you can repeatedly integrate.

→ **Integration by Parts**, when looking for u, look for: logarithmic, inverse trig, algebraic, or exponential functions. in that order

↓

Of the following forms:
1) $\sqrt{a^2 - x^2}$
2) $\sqrt{a^2 + x^2}$
3) $\sqrt{x^2 - a^2}$

↓

Trig sub
1) $x = a \cdot sin(\theta)$
2) $x = a \cdot tan(\theta)$
3) $x = a \cdot sec(\theta)$

A rational function (the ratio of two polynomials) such as: $\frac{7x-23}{x^2-7x+10}$

↓

Try **partial fraction decomposition**. If needed, use long division and factor

https://www.uidaho.edu/sci/mathstat/mac Integral Flow Chart © 2024 by University of Idaho Mathematics Assistance Center is licensed under CC BY 4.0