Lec 8: Strategy for Integration (7.5)

In this lecture we will review all the techniques for integration we have learned this far and discuss strategies for using them. Figuring out how to integrate a given function is not an exact science though, and often involves a bit of guess and check, however the steps outlined below should help streamline the process,

1. Simplify the Integrand if Possible. Sometimes using algebraic manipulation will help simplify the integrand.

EXAMPLE 1. Evaluate $\int (\sin x + \cos x)^2 \, dx$

2. Look for an Obvious Substitution. Substitution should be the first technique we look for when integrating. Sometimes the substitution will be clear.

EXAMPLE 2. Evaluate $\int \frac{2 \sin x}{\sin^2 x + 3 \sin x + 2} \, dx$

EXAMPLE 3. Evaluate $\displaystyle\int \frac{\sqrt{x}}{x-1}\,dx$

3. Classify the Integrand According to its Form. Which previous section of chapter 7 does the integral look most like?

7.1 - by parts
7.2 - trigonometric integrals
7.3 - radicals/trigonometric substitution
7.4 - rational function/partial fractions

EXAMPLE 4. Evaluate $\displaystyle\int \sqrt{\frac{1-x}{1+x}}\,dx$

EXAMPLE 5. Evaluate $\displaystyle\int \frac{\tan^3 x}{\cos^3 x}\,dx$