AP Calculus BC
Unit 8 – Integration Techniques

Day 8 Notes: Integration Using Partial Fractions

**Sometimes it is necessary to "decompose" a rational function into simpler expressions so that we can integrate. We usually decompose a rational function when the denominator is easy to factor.*

CASE 1: Two Linear Factors

$$\int \frac{1}{x^2 + 3x - 18}\, dx$$

CASE 2: Repeated Linear Factors

$$\int \frac{5x^2 + 20x + 6}{x^3 + 2x^2 + x} dx$$

CASE 3: Linear & Quadratic Factors

$$\int \frac{2x^3 - 4x - 8}{(x^2 - x)(x^2 + 4)}\, dx$$

CASE 4: Repeated Quadratic Factors

$$\int \frac{8x^3 + 13x}{(x^2 + 2)^2}\, dx$$

AP Calculus BC **Name: _____**
Unit 8 – Day 8 – Assignment

Use partial fractions to evaluate the integral.

1) $\int \frac{3}{x^2 + x - 2}\,dx$

2) $\int \frac{5 - x}{2x^2 + x - 1}\,dx$

3) $\int \frac{4x^2 + 2x - 1}{x^3 + x^2}\,dx$

4) $\int \frac{x^2 - 1}{x^3 + x}\,dx$

5) $\int \frac{x^2 + 5}{(x + 1)(x^2 - 2x + 3)}\,dx$