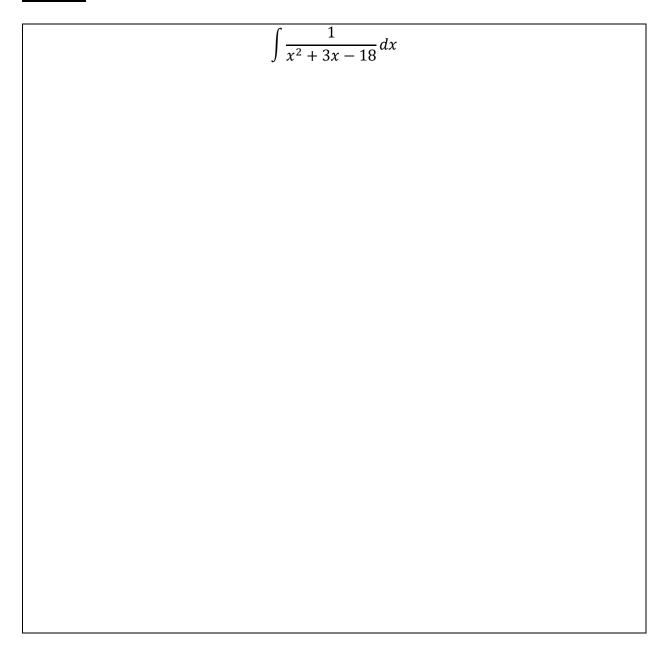
AP Calculus BC Unit 8 – Integration Techniques

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



CASE 2: Repeated Linear Factors

| $\int \frac{5x^2 + 20x + 6}{x^3 + 2x^2 + x} dx$ |
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CASE 3: Linear & Quadratic Factors

| $\int \frac{2x^3 - 4x - 8}{(x^2 - x)(x^2 + 4)} dx$ | |
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| CASE 4 : | Repeated Quadratic I | Factors |
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| | Repeated Quadratic I | $\int \frac{8x^3 + 13x}{(x^2 + 2)^2} dx$ |
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5)

Use partial fractions to evaluate the integral.

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

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

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

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

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