

# LECTURE: CHAPTER 7 REVIEW

## Section 7.1 - Integration by Parts

**Example 1:** Evaluate the following integrals.

(a)  $\int x \cos(2x) dx$

(b)  $\int \frac{\ln x}{x^3} dx$

(c)  $\int \arctan(3x) dx$

## Section 7.2 - Trigonometric Integrals

**Example 2:** Evaluate the following integrals.

(a)  $\int_0^{\pi/2} \sin^5 \theta d\theta$

(b)  $\int \sin^4(5x) dx$

**Example 3:** Evaluate the following integrals.

(a)  $\int \tan^5 \theta \sec^3 \theta d\theta$

(b)  $\int \tan^2 \theta \sec^4 \theta d\theta$

## Section 7.3 - Trigonometric Substitution

**Example 4:** Evaluate  $\int \frac{x^2}{(4-x^2)^{3/2}} dx$

**Example 5:** Evaluate  $\int \frac{1}{(x^2+1)^2} dx$

## Section 7.4 - Integration by Parts

**Example 6:** Give the partial fraction decomposition for the following.

(a)  $\frac{x^2 + 4}{x(x^2 - 4)}$

(b)  $\frac{x^2 + 4}{x^2(x - 4)}$

(c)  $\frac{x^2 + 1}{x(x^2 + 4)}$

**Example 7:** Evaluate  $\int \frac{3x^2 - 2}{x^2 - 2x - 8} dx$

**Example 8:** Evaluate  $\int \frac{5x^2 + 3x - 2}{x^3 + 2x^2} dx$

## Section 7.7 - Approximate Integration

**Example 11:** Approximate  $\int_0^4 \sqrt{x} \cos x dx$  using  $n = 4$  and the:

(a) Trapezoid Rule

(b) Midpoint Rule

(c) Simpson's Rule

## Section 7.8 - Improper Integrals

**Example 12:** Evaluate the integral or show that it is divergent.

(a)  $\int_1^{\infty} x^3 e^{-x^4} dx$

(b)  $\int_0^1 \frac{x-1}{\sqrt{x}} dx$