

**Math 272**  
**Integration Techniques Part II**

Use partial fractions to evaluate each integral.

$$1. \int \frac{3x^2 - 7x - 2}{x^3 - x} dx$$

$$2. \int \frac{x + 1}{x(x^2 + 1)} dx$$

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

Evaluate the improper integral.

$$4. \int_5^{\infty} \frac{dx}{(x - 4)^2}$$

$$5. \int_1^{\infty} \frac{dx}{x}$$

$$6. \int_0^1 \frac{dx}{\sqrt{1 - x}}$$

$$7. \int_0^2 \frac{dx}{(x - 1)^2}$$

8. Use the formula  $\sin Mx \cos Nx = \frac{1}{2} [\sin (M - N)x + \sin (M + N)x]$  to evaluate

$$\int \sin 5x \cos 4x dx.$$

Evaluate the limits.

$$9. \lim_{x \rightarrow \infty} \frac{\ln x}{x^3}$$

$$10. \lim_{x \rightarrow \infty} \frac{e^x}{x^3}$$

$$11. \lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{2x^2}$$

$$12. \lim_{x \rightarrow 0^+} \frac{\sin 2x}{x^2}$$