

**Math 272**  
**Integration Techniques Part I**

Complete the formulas. Assume  $u = f(x)$ :

1.  $\frac{d}{dx}(\ln u) =$

2.  $\frac{d}{dx}(\cos u) =$

3.  $\frac{d}{dx}(\tan u) =$

4.  $\frac{d}{dx}(\sec u) =$

5.  $\frac{d}{dx}(\sin^{-1} u) =$

6.  $\frac{d}{dx}(e^u) =$

7.  $\int \sec^2 u =$

8.  $\int \frac{du}{a^2 + u^2} =$

9.  $\int \frac{du}{u} =$

10.  $\int \tan u =$

11.  $\int \sin u =$

12.  $\int \cot u =$

Use the trigonometric identities to complete the following.

13.  $\frac{1 + \cos 2x}{2} =$

14.  $1 + \cot^2 x =$

15.  $\frac{1 - \cos 2x}{2} =$

16.  $\sec^2 x - 1 =$

17.  $\sin 2x =$

18.  $2\cos^2 x - 1 =$

19.  $\sin(-x) =$

20.  $\cos(-x) =$

Evaluate the integral; show your work:

$$1. \int_{\pi/4}^{\pi/2} \sin^2 x \, dx$$

$$2. \int x^2 \cos x \, dx$$

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

$$4. \int \ln x \, dx$$

$$5. \int \sin^3 2x \cos^2 2x \, dx$$

$$6. \int \sec^4 x \tan^3 x \, dx$$

$$7. \int (1 + x^2)^2 \, dx$$

$$8. \int \frac{2x + 1}{x^2 + 4} \, dx$$

$$9. \int_0^5 \frac{x}{\sqrt{25 - x^2}} \, dx$$

$$10. \int \frac{dx}{\sqrt{4x^2 + 1}}$$