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This Worksheet will be collected at the end of your recitation section on **Thursday, Dec 1st**.

### 5.5. Substitution

Note that we have the following indefinite integrals:

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C$$

$$\int e^x dx = e^x + C$$

$$\int \sin(x) dx = -\cos(x) + C$$

$$\int \cos(x) dx = \sin(x) + C$$

$$\int \sec^2(x) dx = \tan(x) + C$$

$$\int \csc^2(x) dx = -\cot(x) + C$$

$$\int \sec(x) \tan(x) dx = \sec(x) + C$$

$$\int \csc(x) \cot(x) dx = -\csc(x) + C$$

$$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1}(x) + C$$

Compute the following.

1.  $\int (x+3)^{20} dx$

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

3.  $\int_0^{\pi/4} e^{\tan(x)} \sec^2(x) dx$

4.  $\int_0^3 \frac{2}{\sqrt{9-x^2}} dx$

*(Hint: factor 3 out of the denominator; this one is tricky but give it an honest attempt!)*

5.6. Integrals Involving Exponential and Logarithmic Functions

5. Use substitution to find a formula for the indefinite integral

$$\int a^x dx$$

where  $a$  is any positive real number.

6. Show that  $\int \ln x dx = x(\ln x - 1) + C$

7. Find  $\int \log_2(x) dx$ .

8. Find a formula for  $\int \log_b(x) dx$ , where  $b$  is any positive real number.

Questionnaire:

Below are a few questions which are completely optional, and are meant to benefit you. Please only fill out what you feel comfortable with.

1. Is there anyone in class that you'd like to be grouped with next week?

2. Did you feel you worked well with your group this week?

3. Any other comments?

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**Grading Rubric:**

Attendance: /20

Participation: /20

Completeness: /60