

**Math 1552, Integral Calculus**  
**Section 4.8: Antiderivatives**

Name:

1. Evaluate the indefinite integral  $\int (\sqrt{x} - \frac{1}{x})^2 dx$ .

$$\begin{aligned} &= \int \left( x - \frac{2}{\sqrt{x}} + \frac{1}{x^2} \right) dx \\ &= \frac{1}{2}x^2 - 4\sqrt{x} - \frac{1}{x} + C. \end{aligned}$$

2. Evaluate  $\int [4^{-2x} + e^{-5x}] dx$ .

$$= -\frac{1}{2\ln 4}4^{-2x} - \frac{1}{5}e^{-5x} + C.$$

3. Evaluate  $\int \left( \frac{e^{\sqrt{2}+x\sqrt{2}}}{\sqrt{x}} \right) dx$ .

$$\begin{aligned} &= \int \left( e^{\sqrt{2}}x^{-1/2} + x^{\sqrt{2}-1/2} \right) dx \\ &= 2e^{\sqrt{2}}\sqrt{x} + \frac{1}{\sqrt{2}+1/2}x^{\sqrt{2}+1/2} + C. \end{aligned}$$

4. Evaluate  $\int \left( \frac{1}{1+9x^2} \right) dx$ .

$$\begin{aligned} &= \int \left( \frac{1}{1 + (3x)^2} \right) dx \\ &= \frac{1}{3} \tan^{-1}(3x) + C. \end{aligned}$$

5. Evaluate  $\int \left( \frac{2}{3x} - \frac{1}{\sqrt{4-x^2}} \right) dx$ .

$$\begin{aligned} &= \int \left( \frac{2}{3} \cdot \frac{1}{x} - \frac{1}{2} \cdot \frac{1}{\sqrt{1 - \left(\frac{x}{2}\right)^2}} \right) dx \\ &= \frac{2}{3} \ln|x| - \sin^{-1} \left( \frac{x}{2} \right) + C. \end{aligned}$$

6. Evaluate  $\int \cot^2(5x) dx$  (HINT: use a trig formula relating  $\cot^2 x$  to  $\csc^2 x$ .)

$$= \int (\csc^2(5x) - 1) dx = -\frac{1}{5} \cot(5x) - x + C.$$