Worksheet # 26: Transcendental Functions and Other Integrals

1. Evaluate the following indefinite integrals:

   (a) $\displaystyle\int \frac{dx}{x}$

   (b) $\displaystyle\int \frac{dx}{\sqrt{1-x^2}}$

   (c) $\displaystyle\int \frac{dt}{1+t^2}$

   (d) $\displaystyle\int \frac{dv}{|v|\sqrt{v^2-1}}$

   (e) $\displaystyle\int e^x\,dx$

   (f) $\displaystyle\int 2e^{2x}\,dx$

2. Use the equation $b^x = e^{x\ln(b)}$ to find the indefinite integral $\displaystyle\int b^x\,dx$

3. Find b so that $\displaystyle\int_1^b \frac{dx}{x}$ is equal to

   (a) $\ln(3)$

   (b) 3

4. Find b such that $\displaystyle\int_0^b \frac{dx}{1+x^2} = \frac{\pi}{3}$.

5. Which integral should be evaluated using substitution? Evaluate both integrals:

   (a) $\displaystyle\int \frac{9\,dx}{1+x^2}$

   (b) $\displaystyle\int \frac{x\,dx}{1+9x^2}$

6. Find a relation between x and u that yields $\sqrt{16+x^2} = 4\sqrt{1+u^2}$.

7. Evaluate the following indefinite integrals, and indicate any substitutions that you use:

   (a) $\displaystyle\int \frac{dx}{x^2+3}$

   (b) $\displaystyle\int \frac{\cos(\ln(t))\,dt}{t}$

   (c) $\displaystyle\int \frac{x\,dx}{\sqrt{7-x^2}}$

   (d) $\displaystyle\int \frac{dt}{4t^2+9}$

   (e) $\displaystyle\int \frac{\ln(\arccos(x))\,dx}{\arccos(x)\sqrt{1-x^2}}$

   (f) $\displaystyle\int \frac{dt}{|t|\sqrt{12t^2-3}}$

   (g) $\displaystyle\int \frac{dx}{(4x-1)\ln(8x-2)}$

   (h) $\displaystyle\int e^{9-2x}dx$

8. Evaluate the following definite integrals, and indicate any substitutions that you use:

   (a) $\displaystyle\int_{\tan(.5)}^{\tan(1.5)} \frac{dx}{x^2+1}$

   (b) $\displaystyle\int_{-e^2}^{-e} \frac{dt}{t}$

   (c) $\displaystyle\int_{-1/5}^{1/5} \frac{dx}{\sqrt{4-25x^2}}$

   (d) $\displaystyle\int_1^{\sqrt{3}} \frac{dx}{\arctan(x)(1+x^2)}$

   (e) $\displaystyle\int_0^4 \frac{dt}{4t^2+9}$

   (f) $\displaystyle\int_{1/(2\sqrt{2})}^{1/2} \frac{dx}{|x|\sqrt{16x^2-1}}$