1. Find each of the following indefinite integrals. Check your answers by differentiation.

   (a) $\int 4^x\,dx = \dfrac{4^x}{\ln(4)} + C$

   (b) $\int (5^x + x^5 + 5^5)\,dx = \dfrac{5^x}{\ln(5)} + \dfrac{x^6}{6} + 5^5 x + C$

   (c) $\int \left(3y^2 + \dfrac{3}{y^2} + 3\sqrt{y} + \dfrac{3}{\sqrt{y}}\right) dy = y^3 - \dfrac{3}{y} + 2y^{3/2} + 6y^{1/2} + C$

   (d) $\int (12\sin(x) + \sin(12x) + x\sin(12))\,dx$

   $= -12\cos(x) - \dfrac{\cos(12x)}{12} - \dfrac{x^2\sin(12)}{2} + C$

2. Find each of the following definite integrals:

   (a) $\int_0^1 (e^{u/3} + 2)\,du = 3e^{1/3} - 1$

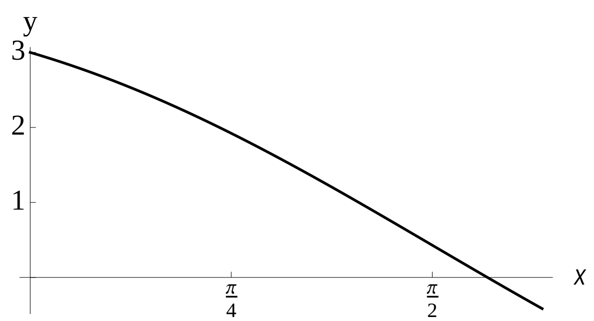
   (b) $\int_{-1}^1 \dfrac{1}{1+x^2}\,dx = \dfrac{\pi}{2}$ (Here, you may wish to recall that $\tan(-\pi/4) = -1$ and $\tan(\pi/4) = 1$.)

3. Solve the initial value problem

$$F'(x) = 2 - x + \cos(x), \quad F(0) = -2.$$

$$F(x) = 2x - \frac{x^2}{2} + \sin(x) - 2.$$

4. Find the area under the graph of $f(x) = 2 - x + \cos(x)$ from $x = 0$ to $x = \pi/2$.



$$\int_0^{\pi/2} f(x)\,dx = 1 + \pi - \frac{\pi^2}{8}$$