1. Compute the exact area of the region bounded by the given curves.
   (a) the x-axis and $y = 2x - x^2$
   (b) the y-axis and $x = y^2 - y^3$
   (c) $y^2 = x$ and $x = 4$
   (d) $y = 2x - x^2$ and $y = -3$
   (e) $y = x^2$ and $y = x$
   (f) $x = 3y - y^2$ and $x + y = 3$
   (g) $y = x^4 - 2x^2$ and $y = 2x^2$
   (h) $\sqrt{x} + \sqrt{y} = 1$ and the coordinate axes

2. Find the area of the region in the first quadrant bounded by the y-axis, the curve $y = \sin x$, and the curve $y = \cos x$.

3. Compute the volume of the solid generated when the area bounded by the given curves and lines is rotated about the x-axis.
   (a) $x + y = 2$, $x = 0$, $y = 0$
   (b) $y = x - x^2$, $y = 0$
   (c) $y = 3x - x^2$, $y = x$
   (d) $y = x$, $y = 1$, $x = 0$
   (e) $y = x^2$, $y = 4$

4. Evaluate the following integrals.
   (a) $\displaystyle\int \frac{dx}{3x + 5}$
   (b) $\displaystyle\int \frac{\sin x}{2 + \cos x}\, dx$
   (c) $\displaystyle\int \frac{x\, dx}{(3x^2 + 4)^3}$
   (d) $\displaystyle\int \frac{x\, dx}{4x^2 + 1}$
   (e) $\displaystyle\int e^{2x}\, dx$
   (f) $\displaystyle\int \sin x\, e^{\cos x}\, dx$
   (g) $\displaystyle\int x e^{-x^2}\, dx$
   (h) $\displaystyle\int \frac{\cos x}{1 + \sin x}\, dx$