1. Differentiate the following functions.

   (a) $f(x) = \ln(x^2 + 3)$

   (b) $g(w) = w\cos(e^w)$

   (c) $h(s) = \dfrac{s^{-3} - \pi}{\sqrt{s}}$

2. Find an antiderivative for each of the following functions.

   (a) $p(x) = 3x^5 + 7x^4 - \dfrac{x^2}{3} + 11$

   (b) $v(t) = 2e^t - 3\cos(3t)$

1. Suppose that $f(x) = x^2 - 3e^x + 4$. Let $F(x)$ be an antiderivative of $f(x)$.
   (a) Is the graph of $f(x)$ increasing or decreasing at $x = -2$?
   (b) Is the graph of $f(x)$ concave up or concave down at $x = -2$?
   (c) Is the graph of $F(x)$ increasing or decreasing at $x = -2$?
   (d) Is the graph of $F(x)$ concave up or concave down at $x = -2$?

2. Find the signed areas given by the following integrals:
   (a) $\displaystyle\int_1^4 \pi - x^{-3/2}\, dx$
   (b) $\displaystyle\int_2^3 6z^5 + \frac{5}{z^{10}}\, dz$