1. Find the following derivatives. Don't worry about algebraic simplifications.

   (a) $\dfrac{d}{dx}\left(\arcsin\left(\dfrac{2x}{e^x} \right) \right)$

   (b) $\dfrac{d}{dx}\left(x^2 \arctan\left(\ln(x) \right) \right)$

   (c) $\dfrac{d}{dx}\left(\arctan\left(\arcsin(x) \right) \right)$

2. For each of the following, find an antiderivative.

   (a) $g(x) = \dfrac{3}{x^2}$

   (b) $h(x) = \dfrac{3}{1 + x^2}$

   (c) $k(x) = \dfrac{7}{\sqrt{1 - (x/6)^2}}$

3. For each of the following, find the signed area given by the integral shown.

   (a) $\displaystyle\int_0^1 \dfrac{1}{4\sqrt{1 - x^2}}\ dx$

   (b) $\displaystyle\int_{-\pi/2}^{\pi/3} \cos(-3x)\ dx$

   (c) $\displaystyle\int_0^1 \dfrac{1}{1 + 9x^2}\ dx$

   (d) $\displaystyle\int_1^{e^{\pi/4}} \dfrac{\sin(\ln(x))}{x}\ dx$