1. Match the graphs to the functions

(a) \( f(x, y) = xy^2 \)
(b) \( f(x, y) = yx^2 \)
(c) \( f(x, y) = x^2 \)
(d) \( f(x, y) = y^2 \)
(e) \( f(x, y) = e^{y-x} \)
(f) \( f(x, y) = xe^y \)
2. Compute the integrals
   (a) \( \int_1^2 \sqrt{2x + 3} \, dx = \)
   (b) \( \int \frac{x^2}{x^3 + 1} \, dx = \)

3. Find the area between the curves \( y = 2x - x^2 \) and \( y = -x \).

4. Find the area between \( y = x^3 \) and \( y = 4x \).

5. Find the derivatives of the functions
   (a) \( f(x) = x^{2x} \)
   (b) \( f(x) = \ln \left( \frac{x+1}{x-1} \right) \)

6. For the functions below, find \( f_x, f_y, f_{xx}, f_{yy}, f_{xy} \) and \( f_{yx} \).
   (a) \( f(x, y) = xy - \ln(x - y) \)
   (b) \( f(x, y) = x \ln(x - y) \)

7. The Sierra Club has determined that the rate of seepage of toxic chemicals from a waste dump, in gallons per year, is given by
   \[
   R(t) = \frac{1000}{(1 + t)^2}
   \]
   where \( t \) is the time in years since the discovery of the seepage. Find the total amount of toxic chemicals that seep from the dump during the first 4 years after the seepage is discovered.