1. Compute

\[ a) \int_{4}^{\infty} x^{-\frac{3}{2}} \, dx \quad b) \int_{4}^{\infty} e^{-3x} \, dx \]

2. Solve:

\[ a) y' = 7y^2, \quad y = 3 \text{ when } x = 1. \]
\[ b) y' = 2x - xy \]

3. Find the volume of the solid formed by revolving the region bounded by

\[ y = \frac{1}{\sqrt[3]{x}}, \quad y = 0, \quad x = 1, \quad x = 4 \text{ about the x-axis.} \]

4. Given a demand function \( D(x) = (x - 8)^2 \) and a supply function \( S(x) = x^2 \), find

\[ a) \text{ The equilibrium point} \]
\[ b) \text{ The consumer surplus at the equilibrium point} \]
\[ c) \text{ The producer surplus at the equilibrium point} \]

5. Let \( z = f(x,y) = e^{3y-2x} \), find

\[ a) f_x(1,2) \]
\[ b) f_y(-2,3) \]
\[ c) f_{xx} \]
\[ d) f_{xy} \]
\[ e) f_{yy} \]

6. Let \( f(x,y) = x^2 + 2xy + 2y^2 - 6y + 2 \). Find and identify all relative max’s and min’s.