MathExcel Worksheet # 2: Area Between Curves

Reminders: Homework 3.1 and 6.1 due Weds.

1. For each of the following, sketch the region enclosed by the given curves and compute the enclosed area.

(a) \( f(x) = x + 1, g(x) = 9 - x^2, x = -1, x = 2. \)

(b) \( y = \sin(x), y = e^x, x = 0, x = 2. \)

(c) \( y = x^2 - 2x, y = x + 4. \)
(d) \( y = 12 - x^2, y = x^2 - 6 \)

(e) \( y = x^2, y = \frac{2}{x^2 + 1} \).

(f) \( y = \frac{1}{x}, y = x, y = \frac{1}{4}x, x > 0 \).
2. Compute \( \int_{0}^{4} |\sqrt{x + 2} - x| \, dx \) and interpret it as the area of a region between curves.

3. Find all values of \( c \) so that the region bounded by the parabolas \( y = x^2 - c^2 \) and \( y = c^2 - x^2 \) is 576.

4. Find a number \( b \) so that the line \( y = b \) divides the region bounded by the parabola \( y = x^2 \) and \( y = 4 \) into two regions with equal area.
5. Find the area of the region bounded by the curve \( y = x^2 \), the tangent line to this curve at \((1, 1)\), and the x-axis.

6. Use calculus to find the area of the triangles with vertices \((0, 0)\), \((2, 1)\), \((-1, 6)\).