Find the area bounded by the graphs of \( y = x^2 - 2x + 3 \), \( y = 1 - x^2 \), \( x = -1 \), and \( x = 2 \). Provide the exact answer.

Find the area bounded by the graphs of \( y^2 = x + 5 \) and \( x - y = 1 \). Provide the exact answers. Show all the necessary calculations by hand.

Find the volume of the solid generated if the region bounded by \( y = \sin 2x \), \( y = 0 \), \( x = 0 \), and \( x = \frac{\pi}{4} \) is rotated about the \( x \)-axis. Provide the exact answer.

Find the volume of the solid generated if the region bounded by \( y = \frac{e^{-\frac{x}{2}}}{x^3} \), \( y = 0 \), \( x = 1 \), and \( x = 2 \) is rotated about the \( y \)-axis. Provide the exact answer.

Find the volume of the solid generated if the region bounded by \( y = x^3 \), \( y = 0 \), \( x = 0 \), and \( x = 2 \) is rotated about the line \( y = -1 \). Provide the exact answer.

Use the techniques of calculus to show that the volume \( V \) of a right circular cone with radius \( r \) and height \( h \) is given by \( V = \frac{1}{3} \pi r^2 h \). Show complete details of your calculation very carefully.

Find the volume of the solid whose base is bounded by \( x^2 + y^2 = 16 \), and whose cross sections perpendicular to the \( x \)-axis are equilateral triangles. Again, show all details including a clear picture of the solid. Provide the exact answer.

Find the arc length of the graph of \( y = \frac{1}{2} + \frac{x^3}{6} \) from \( x = 1 \) to \( x = 4 \). Provide the exact answer. Make sure to show the complete details.