1. A particle travels in a straight line with velocity at time \( t \) given by \( v(t) = t^2 - 3t + 2 \). Find the net distance and the total distance traveled by the particle from \( t = 0 \) to \( t = 3 \).

Answers: \( \frac{3}{2} \) and \( \frac{11}{6} \)

2. The base of a solid is the region in the \( xy \)-plane bounded by the parabola \( y = x^2 \) and the line \( y = 1 \). Find the volume of this solid if every cross section perpendicular to the \( y \)-axis is an equilateral triangle with its base in the \( xy \)-plane.

Answer: \( \sqrt{3}/2 \)

3. Find the volume of the solid obtained by revolving the region bounded by the circle \( (x - a)^2 + y^2 = r^2 \) (\( r \leq a \)) about the \( y \)-axis. Sketch this solid.

Answer: \( 2\pi r^2 a \)

4. Find the length of the portion of the curve \((y - 1)^3 - (x + 1)^2 = 0\) from \((-1, 1)\) to \((7, 5)\).

Answer: \( \frac{8}{27} \left(10^{3/2} - 1\right) \)

5. The portion of the graph of \( x = 1 + 2y^2 \) from \( y = 1 \) to \( y = 2 \) is rotated about the \( x \)-axis. Find the area of the resulting surface.

Answer: \( \frac{\pi}{24} \left(65^{3/2} - 17^{3/2}\right) \)

6. A cylindrical tank of length 40 ft and radius 5 ft rests on its side. If the tank is mounted 4 feet above the ground how much work is done in pumping the tank full of oil (with density \( \rho = 50 \text{ lb/ft}^3 \)) if the oil is pumped in from ground level?

Answer: \( 450000\pi \text{ ft lb} \)