1. Find the volume generated by rotating the region by the given curves.

(a)
$$y = \frac{1}{x^4}$$
, $x = \frac{1}{2}$, $x = 1$, $y = 0$. Rotate about the *y*-axis.

(b) $y = x^3$, x = 0, y = 27. Rotate about the x-axis.

(c) $y = \sqrt{x}$, y = 4x. Rotate about the line x = -1.

(d) $y = x^2$ and $x = y^2$. Rotate about the line y = 3.

2. A force of $F(x) = x^4 - \sin(4\pi x) + 12$ (where x is in meters) acts on an object. What is the work required to move the object from x = 3 to x = 5?

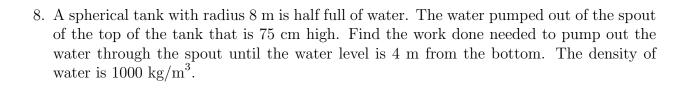
3. If the force required to stretch a spring 3 ft beyond its natural length is 12 lb, how much work is needed to stretch it beyond its natural length?

4. A spring has a natural length of 20 cm. If a 10 J work is required to keep it stretched to a length 25 cm, how much work is done in stretching the spring from 30 cm to 80 cm?

| 5. | A heavy rope 40 ft long, weighs 0.4 lb/ft and hangs over the edge of a tall building. | How |
|----|---|-----|
| | much work is done in pulling the rope to the top of the building? | |

. A uniform cable hanging over the edge of a tall building is 6 m long and weighs 20 kg. If 25 kg weight is attached to the cable, how much work is required to pull 2 m of the cable to the top of the building?

7. A tank of water is 20 ft long and has a vertical cross section in a shape of an equilateral triangle with sides 2 ft long. The tank is filled with water to a depth of 18 inches. Determine the amount of work needed to pump all of the water to the top of the tank. The weight of water is 62.5 lb/ft^3 .



9. Determine the average value of the function $f(x) = \frac{\sqrt{3} - 1}{1 + x^2}$ over the interval $[1, \sqrt{3}]$.

10. Find the value(s) a such that the average value of the function $f(x) = 3x^2 - 2x - 3$ over the interval [a, 0] is equal to 2.