

Section 7.4

1. How much work is done in lifting a 30 lb barbell from the floor to a height of 4 feet?

2. When a particle is at a distance x meters from the origin, a force of $f(x) = 3x^2 + 2$ Newtons acts on it. How much work is done in moving the object from $x = 2$ to $x = 4$?

3. A spring has a natural length of 6 inches. If a 5-lb force is required to maintain it to a length of 18 inches, how much work is required to stretch it from 1 foot to 3 feet?

4. Suppose 2 N of work is needed to stretch a spring 1 meter beyond its natural length. How much work is done in stretching this spring 3.5 m beyond its natural length?

5. A heavy rope, 50 feet long, weighs 0.5 pounds per foot and hangs over the edge of a building 120 feet high. There is a 85 pound weight attached to the end of the rope. How much work is done in pulling the rope to the top of the building?

6. A 200 pound cable is 300 feet long and hangs vertically from the top of a tall building. How much work is required to pull 20 feet of the cable to the top of the building?

7. An aquarium 10 m long, 2 m wide and 1 m deep is full of water. Find the work required to pump half the water to the top of the aquarium.

8. A tank contains water and has the shape of a trough 6 feet long. The end of the trough is an isosceles triangle with height 3 feet and base length 4 feet. The vertex of the triangle is at the bottom. Find the work required to pump all of the water to the top of the tank.

9. A tank is in the shape of sphere with radius 4 m. The water is pumped from a spout at the top of the tank that is 1 m high. Find the work done in pumping the water through the spout.

Section 7.5

10. Find the average value of the function

$$f(x) = \sqrt{x + 1} \text{ over the interval } [3, 8]$$

11. Find the numbers b such that the average value of $f(x) = 2 + 6x - 3x^2$ on the interval $[0, b]$ is equal to 4.

12. Find the average value of $f(x) = 4x - x^2$ over the interval $[0, 3]$ and find the value of c that satisfies the Mean Value Theorem for Integrals.

Section 8.1

13. $\int x e^{7x} dx$

$$14. \int 3x \cos x \, dx$$

$$15. \int_0^1 x e^{2x} dx$$

$$16. \int \frac{\ln x}{x^2} dx$$

$$17. \int_2^3 \ln x \, dx$$

18. $\int \arccos x \, dx$

19. $\int x^5 \sin(x^3) dx$