Exam 2 Review Questions

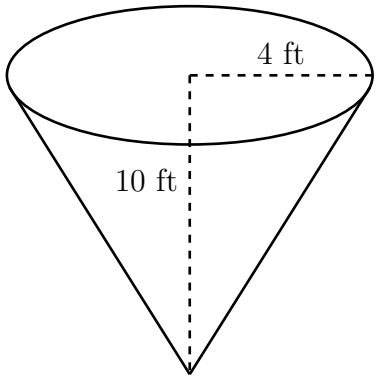
1. A spring has natural length of 20 cm. If a 25 N force is required to keep it stretched to a length of 30 cm, how much work is required to stretch it from 20 cm to 25 cm?

2. A heavy rope, 50 ft long, weighs 0.5 lb/ft and hangs over the edge of a building 120 ft high.

   (a) How much work is done in pulling the rope to the top of the building?

   (b) How much work is done in pulling half the rope to the top of the building?

3. Suppose the following tank is half full of water. How much work is required to pump all the water out of the top of the tank? (Use the fact that water weighs 62.5 lb/ft^3.)



4. Determine whether the sequence converges or diverges. If it converges, find the limit.

$$a_n = \ln(n+1) - \ln n$$

5. Determine whether the geometric series is convergent or divergent. If it is convergent, find its sum.

$$\sum_{n=1}^{\infty} \frac{e^n}{3^{n-1}}$$

6. Express the number as a ratio of integers.

$$10.1\overline{35} = 10.1353535353535353535\ldots$$

7. Determine whether the series is convergent or divergent.

$$\sum_{n=1}^{\infty} n^2 e^{-n^3}$$

8. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n-1}{n^2\sqrt{n}}$$

9. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n+4^n}{n+6^n}$$

10. Determine whether the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{n\cos n\pi}{2^n}$$

11. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{5n+1}$$

12. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

$$\sum_{n=1}^{\infty} \frac{n!}{100^n}$$