TEST 2

This test is modified: the original was based on a different syllabus.

1. Find the points of intersection of \( y = 2x - x^2 \) and \( y = x - 2 \). Set up and evaluate an integral that represents the area between the graphs.

2. The region bounded by \( y = 9 - x^2 \), \( y = 0 \), and \( x = 0 \) is revolved about the \( x \)-axis. Set up and evaluate an integral that represents the volume of the resulting solid.

3. The region bounded by \( y = x^2 + 1 \), \( y = x \), \( x = 0 \), and \( x = 2 \) is revolved about the \( x \)-axis. Find the volume of the resulting solid.

4. The region bounded by \( y = e^x \), \( y = 1 \) and \( x = \ln 2 \) is revolved about the line \( x = \ln 2 \). Set up but do not evaluate an integral that represents the volume of the resulting solid.

5. A spring whose natural length is 1 m exerts a force of 100 N when stretched to a length of 6 m. a) Find the spring constant (include the units in your answer). b) Find the work that is done stretching the spring from its natural length of 1 m to a length of 3 m (include the units in your answer).

6. A cone-shaped water reservoir has an 8 ft radius across the top and is 12 ft deep. The reservoir is filled to a depth of 10 ft. Set up and evaluate an integral that represents the work required to pump all the water to the top of the reservoir (include the final units in your answer). The weight density of water is 62.4 lb/ft\(^3\).

7. Evaluate the integral a) \( \int_{1}^{e^2} \ln t \, dt \) b) \( \int_{1}^{e^2} (\ln t)^2 \, dt \).