Calc. Homework Assignment-MGT1

Class: __________________________

Student Number: _____________________

Name: _____________________________

1. Use the trapezoidal rule and Simpson’s rule to approximate the value of the definite integral

\[ \int_{1}^{2} \ln x \, dx; \quad n = 4. \]

Compare your result with the exact value of the integral. \[ \text{[§7.3 #13]} \]

3. Find the area of the region under the curve

\[ y = f(x) = e^{2x} \]

over the indicated interval \( x \leq 2. \) \[ \text{[§7.4 #9]} \]

2. The reservoir located in Central Park in New York City has the shape depicted in the following figure. The measurements shown were taken at 206-ft intervals. Use Simpson’s rule with \( n = 10 \) to estimate the surface area of the lake. \[ \text{[§7.3 #34]} \]

4. Evaluate each improper integral whenever it is convergent.

a. \[ \int_{-\infty}^{0} \frac{1}{(4 - x)^{3/2}} \, dx \]

b. \[ \int_{-\infty}^{\infty} \frac{xe^{-x^2}}{1 + e^{-x^2}} \, dx \] \[ \text{[§7.4 #24 40]} \]

(Over Please)
5. Show that an integral of the form
\[ \int_a^\infty e^{-px} \, dx \]
is convergent if \( p > 0 \) and divergent if \( p \leq 0 \). \([\text{§7.4 #52}]\)

6. Find the volume of the solid that is obtained by revolving the region about the indicated axis or line. \([\text{§7.5 #4}]\)

7. Find the volume of the solid of revolution obtained by revolving the region bounded above by the curve \( y = f(x) = \sqrt{16 - x^2} \) and below by the curve \( y = g(x) = x \) from \( x = 0 \) to \( x = 2\sqrt{2} \) about the \( x \)-axis. \([\text{§7.5 #19}]\)

8. Find the volume of the prolate spheroid (a solid of revolution in the shape of a football) obtained by revolving the region under the graph of the function \( y = \frac{3}{5}\sqrt{25 - x^2} \) from \( x = -5 \) to \( x = 5 \) about the \( x \)-axis. \([\text{§7.5 #32}]\)