8.8

1. Use the Trapezoidal Rule with $n = 8$ to approximate the integral $\int_{5}^{9} \sqrt{x} \sin 4x \, dx$.

2. Use the Midpoint Rule with $n = 8$ to approximate the integral $\int_{5}^{9} \sqrt{x} \sin 4x \, dx$.

3. Use Simpson’s Rule with $n = 8$ to approximate the integral $\int_{5}^{9} \sqrt{x} \sin 4x \, dx$.

4. Use the appropriate error bound formula to determine how large $n$ should be to guarantee that the Simpson’s Rule approximation to $\int_{0}^{f} e^{x^2} \, dx$ is accurate to within 0.3. Choose the smallest value of $n$ for which the inequality is true, then estimate the integral using this value of $n$.

8.9

5. Determine whether the integral $\int_{-\infty}^{\infty} 7xe^{-2x^2} \, dx$ is convergent or divergent. Evaluate the integral if it is convergent.

6. Determine whether the integral $\int_{0}^{3} \frac{1}{\sqrt{x}} \, dx$ is convergent or divergent. Evaluate the integral if it is convergent.
7. Which of the following integrals are divergent? Choose all that apply.

(a) \( \int_{0}^{1} \frac{1}{x^2 \sqrt{x}} \, dx \)

(b) \( \int_{0}^{6} \frac{1}{x} \, dx \)

(c) \( \int_{0}^{3} \frac{1}{x \sqrt{x}} \, dx \)

(d) \( \int_{-1}^{0} \frac{1}{x^2} \, dx \)

(e) \( \int_{0}^{2} \frac{1}{\sqrt{x}} \, dx \)

8. Use the Comparison Theorem to determine whether the integral \( \int_{1}^{\infty} \frac{1}{5x^3 + e^{2x}} \, dx \) is convergent or divergent.

9. Find the values of \( r \) for which the integral \( \int_{0}^{1} \frac{1}{x^r} \, dx \) converges. Evaluate the integral for those values of \( r \).

10. Determine whether the integral \( \int_{1}^{\infty} \frac{1}{(8x + 7)^2} \, dx \) is convergent or divergent. Evaluate the integral if it is convergent.

11. Determine whether the integral \( \int_{0}^{\infty} \frac{x \tan^{-1} 8x}{(1 + 64x^2)^2} \, dx \) is convergent or divergent. Evaluate the integral if it is convergent.