Math 10A
Homework #7; Due Tuesday, 7/17/2018
Instructor: Roy Zhao

---

1. Approximate the integral $\int_0^4 \frac{1}{1+x^2}\,dx$ using the right endpoint rule with $n = 4$ subintervals. You don't need to simplify.

2. Approximate the integral $\int_{-\pi}^{\pi} \sin(x)\,dx$ using the left endpoint rule with $n = 4$ subintervals. You don't need to simplify.

3. Approximate the integral $\int_0^3 e^x\,dx$ using the midpoint rule with $n = 3$ subintervals. You don't need to simplify.

4. Approximate the integral $\int_0^3 e^x\,dx$ using the trapezoid rule with $n = 3$ subintervals. You don't need to simplify.

5. For each of the following integrals, determine how many subintervals are required to guarantee accuracy to within $5 \cdot 10^{-5}$ using (i) the midpoint rule, (ii) the trapezoid rule, (iii) Simpson's rule. You don't need to compute the approximation!

   (a) $\int_2^3 x^2\,dx$

   (b) $\int_{-\pi}^{\pi} \sin(x)\,dx.$

   (c) $\int_1^5 \frac{1}{x} dx.$

6. Approximate the integral $\int_0^{\pi} \sin(x)\,dx$ to within 0.5 using the midpoint rule (by first determining how many subintervals are required to guarantee accuracy and then finding the approximation).

7. Use Simpson's rule and $n = 4$ intervals to estimate the area between -1 and 1 for a $f(x) = e^{-x^2}$. You don't need to simplify.

8. True False Suppose that the function f is strictly increasing on $[a, b]$. Then, the estimate of $\int_a^b f(x)\,dx$ obtained using the left endpoint rule is an underestimate.

9. True False Suppose that $f''(x) = 0$ for all $x \in [a, b]$. Then, the trapezoid rule computes $\int_a^b f(x)\,dx$ exactly.

10. True False Simpson's rule computes $\int_{-1}^3 x^3 - 3x dx$ exactly no matter how many intervals are used.