

## CSE541 Homework 6

Due Wednesday, May 14 at class time

Consider the following integral for questions 1, 2, 3:

$$\int_{10}^{42} e^{\cos(x/4)} dx$$

1. Approximate the integral by using the trapezoid rule for 1, 2, 4 and 8 equal width trapezoids. Use the recursive trapezoid formula. Show your work.
2. Apply Romberg's algorithm to the integral approximations for 1, 2, 4 and 8 trapezoids to get the best possible approximation from those values. Show your work.
3. Approximate the integral by applying Simpson's algorithm on 4 and 8 subintervals. (Evaluate  $f$  at 5 and 9 nodes, respectively.) Show your work.
4. Derive the Three-Point Newton-Cotes Open Rule:

$$\int_{x_0}^{x_4} f(x) dx = \frac{4}{3} h [2f(x_1) - f(x_2) + 2f(x_3)]$$

Hint: Similar to how Simpson's rule was derived.