Problem Sheet #7 (Oct 6, 2021)

1. Evaluate the following integral:

$$I = \int_0^3 (1 - e^{-x})dx$$

a) Analytically
b) Single application of trapezoidal rule
c) Multiple application of trapezoidal rule, with n=4
d) Single application of Simpson's 1/3 rule
e) Multiple application of Simpson's 1/3 rule with n=4

2. Evaluate the integral of the following tabular data with a) trapezoidal rule and b) Simpson's rules.

x	-2	0	2	4	6	8	10
F(x)	35	5	-10	2	5	3	20

3. Evaluate the following integral with MATLAB using both the "quad" and "quadl" functions. To learn more about "quadl", type "help quadl" at the MATLAB prompt.

$$I = \int_0^{2\pi} \frac{\sin t}{t} dt$$

4. Use the "diff" command in MATLAB and compute the finite-difference approximation to the first and second derivative at each x-value in the table below, excluding the two end points. Use finite-difference approximations that are second-order correct $O(h^2)$.

x	0	1	2	3	4	5	6	7	8	9	10
y	1.4	2.1	3.3	4.8	6.8	6.6	8.6	7.5	8.9	10.9	10