

MA114 Summer II 2017
Worksheet 5 – Approximate Integration
6/15/17

1. Use the midpoint rule to approximate the value of $\int_{-1}^1 e^{-x^2} dx$ with $n = 4$.
2. Draw the graph of $f(x) = \sin(\frac{1}{2}x^2)$ in the region $[0, 1]$ by $[0, 0.5]$ and let $I = \int_0^1 f(x) dx$.
 - (a) Use the graph to decide whether L_2, R_2, M_2 , and T_2 underestimate or overestimate I .
 - (b) For any value of n , list the numbers L_n, R_n, M_n, T_n , and I in increasing order.
 - (c) Compute L_5, R_5, M_5 , and T_5 . From the graph, which do you think gives the best estimate of I ?
3. Approximate the integral $\int_1^2 \frac{1}{x} dx$ using Simpson's rule. Choose n so that your error is certain to be less than 10^{-3} . Compute the exact value of the integral and compare it to your approximation.