

### More Numerical Integration Methods

For 1–3, use the Trapezoid Rule and Simpson’s Rule to approximate the definite integral for the stated value of  $n$ . Use approximations to four decimal places for  $f(x_i)$  and round off answers to three decimal places. Compare your results to the evaluation for the definite integral found by using the numerical integration [MATH 9] feature of the TI-83.

1.  $\int_1^4 x^x dx, \quad n = 6$

2.  $\int_0^1 e^{x^2} dx, \quad n = 4$

3.  $\int_{\pi/4}^{\pi/2} \sin(\cos x) dx, \quad n = 4$

For 4–5, the data in the tables below were obtained experimentally, where  $x$  and  $y$  are physical variables. Assuming that  $y = f(x)$  where  $f$  is continuous, approximate the definite integral  $\int f(x) dx$  on given interval by means of (a) the Trapezoid Rule, (b) Simpson’s Rule, and (c) the Midpoint Rule.

4.

$x$	0	1	2	3	4	5	6	7	8
$y$	-2.5	-4.5	-1.0	1.5	3.5	2.0	-1.0	-4.0	-2.0

5.

$x$	-1.2	-0.8	-0.4	0	0.4	0.8	1.2	1.6	2.0	2.4	2.8
$y$	-125	-80	-60	-50	-20	40	100	160	240	120	60

6. After finally getting his big break, Homer Simpson has just purchased a lake high in the mountains for relaxing during his retirement years. He desires to know the area of the lake (in acres). Use the grid right (each division is 100 feet) and Simpson’s Rule to calculate the area of Lake Simpson. Convert your answer to acres (1 acre = 43560 square feet).

