Math 261 - Lab 24 **Numerical Integration** **Name:** _____

1. Approximate $\int_2^5 \frac{1}{x+1}\,dx$ using $n = 6$ and the given rule. Also find the maximum error (and use that error to determine where to round your approximations).

   (a) using the Trapezoidal Rule

   (b) using Simpson's Rule

2. Find the n necessary to approximate $\displaystyle\int_{-2}^{2} \frac{2x+1}{x-3}\,dx$ correct to six decimal places using

(a) the Trapezoidal Rule.

(b) Simpson's Rule.

3. (Adapted from the 2006 AP Calculus AB exam) A car travels on a straight track. During the time interval $0 \leq t \leq 60$ seconds, the car's velocity v, measured in feet per second, and acceleration a, measured in feet per second per second, are continuous functions. The table below shows selected values of these functions.

t (sec)	0	10	20	30	40	50	60
$v(t)$ (ft/sec)	-20	-30	-20	-14	-10	0	10
$a(t)$ (ft/sec^2)	1	5	2	1	2	4	2

(a) Using appropriate units, explain the meaning of $\int_0^{60} |v(t)| \, dt$ in terms of the car's motion.

(b) Approximate $\int_0^{60} |v(t)| \, dt$ using a trapezoidal approximation with the subintervals determined by the table. Give your answers rounded to three significant digits.

(c) Approximate $\int_0^{60} |v(t)| \, dt$ using a Simpson's approximation with the subintervals determined by the table. Give your answers rounded to three significant digits.