Math 260
Lab 11 – Riemann Sums Activity **Name:**_____

Instructions: For questions 1, 2, and 3(a), use the Riemann Sums Tutor, found on the main toolbar of *Maple* at **Tools - Tutors - Calculus-Single Variable - Riemann Sums** (or **Tools - Tutors - Calculus-Single Variable - Approximate Integration ...**).

1. Approximate the area under the graph of $f(x) = x + 4 + 2\cos(3x)$, $x \in [-2.5, 4]$. Display the result five times using *random* and $n = 10$. Record the results below. (Note that this is not actually a fully random Riemann Sum since the partition size does not vary.)

   (a)

   (b)

   (c)

   (d)

   (e)

   Are the approximations reasonable?

2. Find a Riemann sum for the function $f(x) = -x(x^2 - 4)$ on each of the listed intervals. Display the result using *random* and $n = 10$. Do the sum three times on each interval. Record the results below.

   (a) $[-2, 2]$
   i.

   ii.

   iii.

   (b) $[-3, 2]$
   i.

   ii.

   iii.

   (c) $[-2, 3]$
   i.

   ii.

   iii.

   Explain why some values are negative, positive, or (approximately) zero.

3. Consider the area under the graph of $f(x) = x^3 - 2x^2 - 5x + 12$, $x \in [-2, 4]$.

   (a) Complete the table using the appropriate selection from the Riemann Sums Tutor.

n	Left endpoint	Right endpoint	Midpoint	Trapezoidal
6				
10				
30				
60				
100				

   (b) In a **Maple** document, approximate the area of f when $n = 20$. Do the calculation for the left endpoint, the right endpoint, and the midpoint.

4. Let $g(x) = 3 + \sin x$, $x \in [-\pi, \pi]$. In a **Maple** document, approximate the are for g when $n = 20$. Do for the left endpoint, the right endpoint, and the midpoint. Approximate your answers to five places.

Note: Solutions for 3(b) and 4 may be checked using either the Riemann Sums tutor or *Maple's RiemannSum* command, but you must complete the summation yourself using the summation symbol in *Maple*.

To submit this assignment, email the Maple file for 3(b) and 4 as usual, and hand in this worksheet with your answers to 1, 2, and 3(a) to my mailbox or office.