Math 260
Lab 12 – 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 $f(x) = 3\sin(2x) + 2\cos(3x)$, $x \in [-\pi, \pi]$. 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? Do they seem to be accurate?

2. Find a Riemann sum for the function $f(x) = e^{\frac{x}{2}} - x^4 + 17x^2$ 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) $[0, 4]$
   i.

   ii.

   iii.

   (c) $[-4, 0]$
   i.

   ii.

   iii.

   Comment on the values that you found. Are any of the values interesting or surprising?

3. Consider the area under the graph of $f(x) = \frac{e^{2x}+e^{-2x}}{5}$, $x \in [-2, 1]$.

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

n	Left endpoint	Right endpoint	Midpoint	Trapezoidal
12				
20				
40				
80				
120				

   (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. You should input and evaluate Riemann sums yourself for this part of the problem.

4. Let $g(x) = 3 + \cos x$, $x \in [-\pi, \pi]$. 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.