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 $f(x) = 5\sin(2x) + 2\cos(3x - 3)$, $x \in [0, \pi]$. 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 $f(x) = e^{\frac{x^2}{25}} - x^3 + 7x^2$ 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) $[0, 2]$

      i.

      ii.

      iii.

   (c) $[-2, 0]$

      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 $f(x) = \frac{e^{-x} + e^{2x}}{12}$, $x \in [-3, 2]$.

   (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 using summation notation yourself for this part of the problem.

4. Let $g(x) = 3 + \sin 2x$, $x \in [-\pi, \pi]$. 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.