HomeWork1 mat 156

Homework

1. Use the **Tools--Tutors--Calculus1--Riemann Sum** tutor to get approximations to the area of the following regions. This tutor is found in the drop down menu under **Tools** on top of the maple window. The a, b in the tutor and the function define the region we want.
   1. sin(x) between 0 and pi (their default). Look at upper and lower and find a number of regions so that you know the Riemann Sum within .01. You cannot use the knowledge of the actual Riemann sum that you can calculate with Maple or by hand integration methods.
   2. f(x) := x->3 (you would put 3 for f(x) in their tutor) between 0 and 1. Can you calculate the area from geometry? Does the Riemann Sum change varying the number of partitions or the methods like middle, upper lower.
   3. f(x) := x->2*x (you would put 2*x in their tutor) between 0 and 1. Can you calculate the area from geometry? Look at upper and lower and find a number of regions so that you know the Riemann Sum within .01. You cannot use the knowledge of the actual Riemann sum that you can calculate with Maple or by hand integration methods.
   4. f(x) := x-> (1-x^2)^.5 (just put value on right in their tutor) between 0 and 1. Can you calculate the area from geometry and what the graph is. You should plot the function with the command
      $$f := x \rightarrow \left(1 - x^2\right)^{.5};$$
      $$plot(f(x), x = -1 .. 1, scaling = constrained);$$ The constrained option makes sure that the axis have the same units and figures will appear with proper proportions. Look at upper and lower and find a number of regions so that you know the Riemann Sum within .01. You cannot use the knowledge of the actual Riemann sum that you can calculate with Maple or by hand integration methods.
   5. f(x) := x^2; between 0 and 1. Can you calculate this from geometry. How about from the calculus you have just learned.Look at upper and lower and find a number of regions so that you know the Riemann Sum within .01. You cannot use the knowledge of the actual Riemann sum that you can calculate with Maple or by hand integration methods.
   6. f(x) := exp(x) between 0 and 1. Can you calculate this from geometry. How about from the calculus you have just learned.
   7. f(x):= sin(x) between -Pi/2 and Pi/2. Is the upper sum always bigger than the lower sum? (find this out by experimentation)
2. Use the Maple commands demonstrated in class(example below in bold). Find a small enough partitions for random[...] so that the sum does not change more than .01 but for the function x^3 instead of x^2 when you modify the method parameter. Try several examples when using method=random. What happens when you use a particular method=? and change to different smaller seeds. Can you get this to not change very much?
   1. **with(Student[Calculus1]);**
      RiemannSum(x^2, x = 0 .. 1, method = upper, partition = random[0.5e-1], output = plot);