Applications of Riemann Sums

For each of the following problems, clearly delineate each of the following steps (as done in class) to arrive at the desired quantity:

1. Divisions: Use n intervals to create n divisions,
2. For each division: Approximate the desired quantity using and.
3. Sum: Approximate the total desired quantity with
4. Limit: Make the approximation precise and solve.

**NO CREDIT GIVEN WITHOUT THESE FOUR JUSTIFYING STEPS**

1. Find the area under the curve ,
2. As a run progresses, the velocity of a runner slows. Find the distance travelled from x = 0 to x = 4 hours when the velocity is given by

where *x* is the number of hours that have passed.

1. As a projectile falls, the velocity of a projectile accelerates. Find the distance that a projectile falls in the first 3 seconds if its velocity is given by

, *where* *x* is the number of seconds that have gone by.

1. Tips fluctuate from peak to slow hours. Find the money earned by a server over a four-hour shift from x=0 to x=4 hours if his salary is given by , where *x* is the number of hours that have passed.
2. Find the area under the curve ,
3. A leak in a tank gets worse as time goes by. Find how many gallons of liquid have leaked from the tank over the first 5 minutes if the rate that fluid leaks is given by and *x* is the number of minutes that have gone by.
4. Find an expression for the length of the curve from *x = 0* to *x = 4*. You ton’t have to solve the integral.
5. Find an expression for the length of the curve , . You don’t have to solve the integral.
6. Optional: A pyramid with a height of 10 m has

*width = 10 – x* *m* and

*length = 20 - 2x m*

where x = the height of the pyrameid at that point. Find the volume of the pyramid.