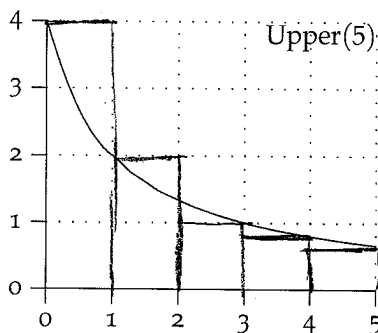
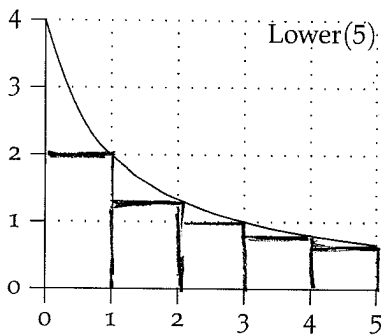


Hand In. Use the models on the Day 3 Handout to help with these.

o. Do the Day03 problems on WeBWork.

1. Geometry Basics. Draw Lower(5) and Upper(5) for the function below on the interval [0, 5].



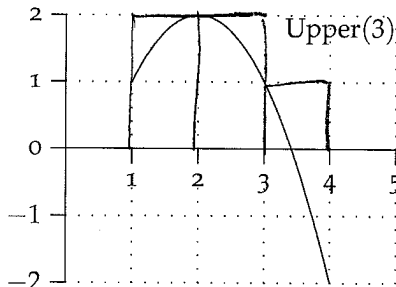
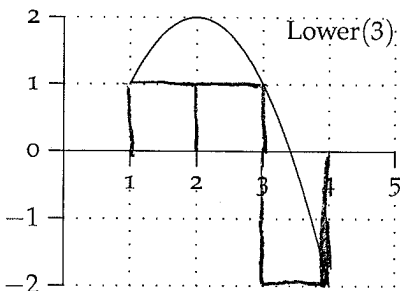
(a) Use the graph to estimate Lower(5)  $\Delta x = \frac{5-0}{5} = 1$

$$\sum_{k=1}^5 f(m_k) \Delta x = 2(1) + 1.3(1) + 1(1) + 0.8(1) + 0.6(1) = 5.7$$

(b) Use the graph to estimate Upper(5)

$$\sum_{k=1}^5 f(M_k) \Delta x = 4(1) + 2(1) + (1.3)(1) + 1(1) + 0.8(1) = 9.1$$

2. Geometry Basics. Draw Lower(3) and Upper(3) for the function below on the interval [1, 4]. **Caution:** Watch out for your heights!



$$\Delta x = \frac{4-1}{3} = 1$$

(a) Use the graph to estimate Lower(3)

$$\sum_{k=1}^3 f(m_k) \Delta x = 1(1) + 1(1) + (-2)(1) = 0$$

(b) Use the graph to estimate Upper(3)

$$\sum_{k=1}^3 f(M_k) \Delta x = 2(1) + 2(1) + (1) = 5$$

3. Each of the functions below is increasing so the right hand endpoints are used to find the upper sums. Fill in the following table (but do not simplify the sum):

See similar problems on WeBWork set Day03.

$f(x)$	$[a, b]$	$\Delta x = \frac{b-a}{n}$	$x_i = a + i\Delta x$	Simplified $f(x_i)$	Upper( $n$ ) = $\sum_{i=1}^n f(x_i)\Delta x$
$2x^2 - 2$	$[1, 3]$	$\frac{3-1}{n} = \frac{2}{n}$	$1 + \frac{2i}{n}$	$\frac{8i}{n} + \frac{8i^2}{n^2}$	$\sum_{i=1}^n \left( \frac{8i}{n} + \frac{8i^2}{n^2} \right) \left( \frac{2}{n} \right)$
$(x+1)^3$	$[-1, 3]$	$\frac{3+1}{n} = \frac{4}{n}$	$1 + \frac{4i}{n}$	$\left( \frac{4i}{n} \right)^3 = \frac{64i^3}{n^3}$	$\sum_{i=1}^n \frac{64i^3}{n^3} \cdot \frac{4}{n}$

Over

Math 131 Day 3

#3 p316 #16  $f(x) = \frac{1}{x}$  on  $[1, 5]$ ,  $n=4$ ,  $\Delta x = \frac{5-1}{4} = 1$

Left(4) =  $f(1) \cdot 1 + f(2) \cdot 1 + f(3) \cdot 1 + f(4) \cdot 1$   
 $= 1 \cdot 1 + \frac{1}{2} \cdot 1 + \frac{1}{3} \cdot 1 + \frac{1}{4} \cdot 1 = \frac{25}{12} = 2\frac{1}{12} = 2.08\bar{3}$

Right(4) =  $f(2) \cdot 1 + f(3) \cdot 1 + f(4) \cdot 1 + f(5) \cdot 1$   
 $= \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{77}{60} = 1.28\bar{3}$

p317 #28  $\Delta x = \frac{5-1}{8} = \frac{1}{2}$

Left(8) =  $[f(1) + f(1.5) + f(2) + f(2.5) + f(3) + f(3.5) + f(4) + f(4.5)] \cdot \frac{1}{2}$   
 $= \frac{1}{2} [0 + 2 + 3 + 2 + 2 + 1 + 0 + 2] = 6$

Right(8) =  $[f(1.5) + f(2) + f(2.5) + f(3) + f(3.5) + f(4) + f(4.5) + f(5)] \cdot \frac{1}{2}$   
 $= \frac{1}{2} [2 + 3 + 2 + 2 + 1 + 0 + 2 + 3] = 7.5$

p318 #58  $\Delta x = \frac{6-0}{3} = 2$

① Left(3) =  $1 \cdot 2 + 6 \cdot 2 + 9 \cdot 2 = 32$

Right(3) =  $6 \cdot 2 + 9 \cdot 2 + 11 \cdot 2 = 52$

p319 #62 (a) Amount of water = area under curve on  $[0, 4]$   
 $=$  area of triangle on  $[0, 4]$   
 $= \frac{1}{2} (4)(4000) = 8000 \text{ ft}^3$

② (b) Amt of water = area under curve on  $[8, 10]$   
 $=$  area of rectangle on  $[8, 10]$   
 $= bh = 2(5000) = 10,000 \text{ ft}^3$