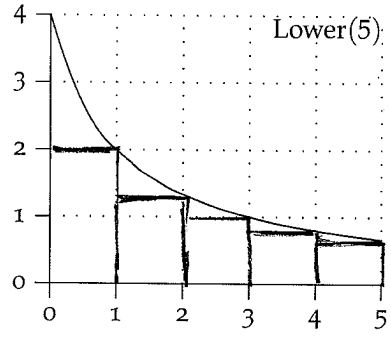
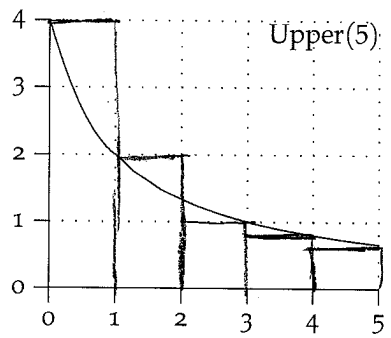
Hand In. Use the models on the Day 3 Handout to help with these.

0. Do the Day03 problems on WeBWorK.

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





(6)

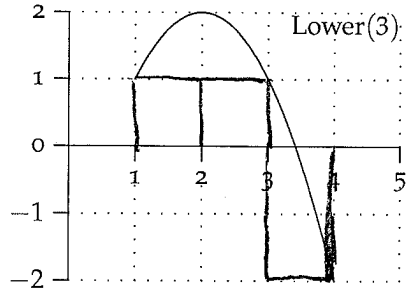
(*a*) Use the graph to estimate Lower(5) $\Delta x = \frac{5-0}{5} = 1$

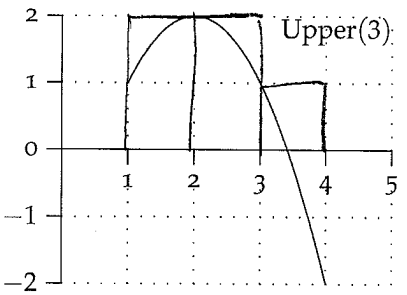
$$\sum_{k=1}^{5} f(m_k)\,\Delta x = 2(1) + 1.3(1) + 1(1) + .8(1) + .6(1) = 5.7$$

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

$$\sum_{k=1}^{5} f(M_k)\,\Delta x = 4(1) + 2(1) + (1.3)(1) + 1(1) + .8(1) = 9.1$$

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





(6)

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

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

$$\sum_{k=1}^{3} f(m_3)\,\Delta x = 1(1) + 1(1) + (-2)(1) = 0$$

(*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.

(6)

$f(x)$	$[a,b]$	$\Delta x = \frac{b-a}{n}$	$x_i = a + i\Delta x$	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 p 344 #18 $f(x) = 1/x$ on $[1,5]$, $n=4$, $\Delta x = \frac{5-1}{4} = 1$

$$\text{Left}(4) = f(1)\cdot 1 + f(2)\cdot 1 + f(3)\cdot 1 + f(4)\cdot 1$$
$$= 1\cdot 1 + \tfrac{1}{2}\cdot 1 + \tfrac{1}{3}\cdot 1 + \tfrac{1}{4}\cdot 1 = \tfrac{25}{12} = 2\tfrac{1}{12} = 2.08\overline{3}$$

(4)

$$\text{Right}(4) = f(2)\cdot 1 + f(3)\cdot 1 + f(4)\cdot 1 + f(5)\cdot 1$$
$$= \tfrac{1}{2} + \tfrac{1}{3} + \tfrac{1}{4} + \tfrac{1}{5} = \tfrac{77}{60} = 1.28\overline{3}$$

p 344 #36 $\Delta x = \frac{5-1}{8} = \frac{1}{2}$

$$\text{Left}(8) = \left[f(1) + f(1.5) + f(2) + f(2.5) + f(3) + f(3.5) + f(4) + f(4.5)\right]\tfrac{1}{2}$$
$$= \tfrac{1}{2}\left[0+2+3+2+2+1+0+2\right] = 6$$

(4)

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

p 346 #64 $\Delta x = \frac{6-0}{3} = 2$

(2)
$$\text{Left}(3) = 1\cdot 2 + 6\cdot 2 + 9\cdot 2 = 32$$
$$\text{Right}(3) = 6\cdot 2 + 9\cdot 2 + 11\cdot 2 = 52$$

p 346 #68 (a) Amount of water = area under curve on $[0,4]$
= area of triangle on $[0,4]$
$= \frac{1}{2}(4)(4000) = 8000\ ft^3$

(2)

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