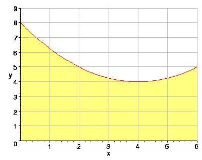
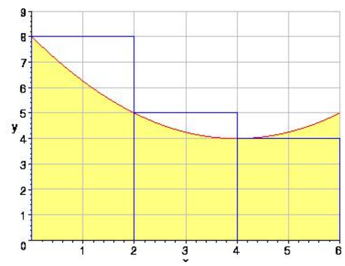
Math 151 Name KEY
Quiz 9

1. Consider the graph below:

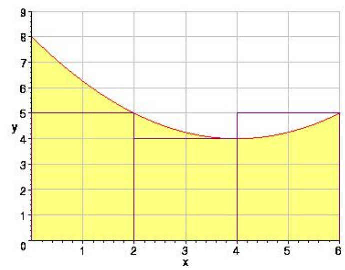


(a) Find L_3. (That is, estimate the shaded area by using four rectangles and left endpoints.)



$$\begin{aligned} L_3 &= 2*8+2*5+2*4 \\ &= 34 \end{aligned}$$

(b) Find R_3.



$$\begin{aligned} R_3 &= 2*5+2*4+2*5 \\ &= 28 \end{aligned}$$

2. (a) Express $\lim_{n\to\infty} \sum_{i=1}^{n} \left(4\left(2+\frac{3i}{n}\right)+\left(2+\frac{3i}{n}\right)^3\right)\frac{3}{n}$ as a definite integral.

We see from our usual limit form of $\lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\triangle x$ that

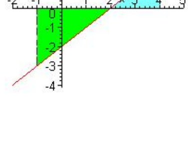
$\triangle x = \frac{b-a}{n} = \frac{3}{n}$ and $x_i = a + i\triangle x = 2 + \frac{3i}{n}$

Putting these together, we see that $a = 2$ and $b = 5$ (since $b - a = 3$).

Now, the function that is acting on x_i is the function $f(x) = 4x + x^3$.

So, $\lim_{n\to\infty} \sum_{i=1}^{n} \left(4\left(2+\frac{3i}{n}\right)+\left(2+\frac{3i}{n}\right)^3\right)\frac{3}{n} = \int_a^b f(x)\,dx = \int_2^5 4x + x^3\,dx$

(b) Find $\int_{-1}^{4} x - 2\,dx$ by interpreting it in terms of areas.



$$\begin{aligned} \int_{-1}^{4} x-2\,dx &= \frac{1}{2}*2*2-\frac{1}{2}*3*3 \\ &= -\frac{5}{2} \end{aligned}$$