Solutions To Even Problems

5.1

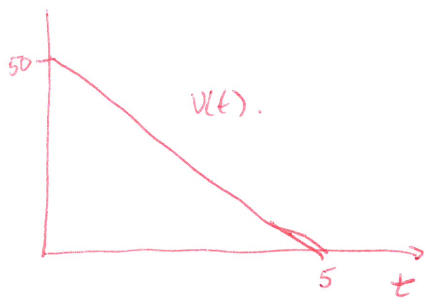
4. lower Estimate 122 feet

   Uppo Estimate 298 feet.

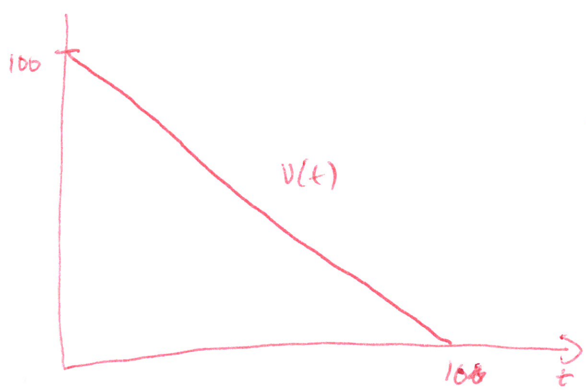
   The estimate in this case should be the average $= \frac{1}{2}(122 + 298)$.

14. (b) The distance travelled is the area under the graph. The region is a triangle of base 5 and height = 50. Area $= \frac{1}{2} \cdot 5 \cdot 50 = \underline{125 \text{ feet}}$

(a)



(c)



Distance $= \frac{1}{2} \cdot 100 \cdot 10 = 500$ ft.

28. (a) $n = 6$, $\Delta t = 5$

$t_0 = 1981$, $t_1 = 1986$, $t_2 = 1991$, $t_3 = 1996$, $t_4 = 2001$, $t_5 = 2006$, $t_6 = 2011$

$f(t_0) = 20.1$, $f(t_1) = 21.3$, $f(t_2) = 21.9$, $f(t_3) = 23.4$, $f(t_4) = 24.2$

$f(t_5) = 29.1$, $f(t_6) = 34.7$

Left sum $= 700$, ~~so~~ so we estimate 700 from left sum

(b) This is a lower estimate because the amount of CO_2 released is increasing.

(c) $n=3$ $\Delta t = 10$.

$t_0 = 1981$, $t_1 = 1991$, $t_2 = 2001$, $t_3 = 2011$

$f(t_0) = 20.1$ $f(t_1) = 21.9$, $f(t_2) = 24.2$, $f(t_3) = 34.7$

Right end sum $= (21.9)(10) + (24.2)(10) + (34.7)(10) = 808$ Billion tons.

5.2, 8 Left end sum $= 606$ Average $= \frac{1}{2}(606 + 480)$

Right end sum $= 480$ $= \underline{543}$

So $\int_0^{15} f(x)dx \simeq \underline{543}$

5.3, 20 $\int_0^{20} f(x)dx \cong 337.5$.

5.4, 16

(a) The length growth rate is the derivative of the length function.

The derivative is maximum when $f''(x) = 0$ i.e. an inflection point of f.

(b) Total length $= \underline{56.2}$

5.5

2. $\int_{800}^{900} C'(q)\,dq$ — cost of increasing production from 800 to 900

4. The area under the graph $\cong 15.3$ ~~so~~ grid squares each has area 0.5

$$\int_{1970}^{1990} P'(t)\,dt \simeq 15.3(0.5) = \underline{\underline{7.65 \text{ million people.}}}$$

8. (a) Total cost = fixed Costs + Variable Costs

$$10{,}000 + \int_0^{400} C'(q)\,dq$$

$$= 10{,}000 + 8650 = \$18{,}650$$

(b) $C'(400) = 28$, so we expect an extra $\underline{\$28}$