MAT 21B, Spring 2019
Solutions to homework 1

Section 5.1

2. (10 points) (a) (2 points) Using lower sum with two rectangles:

$$0.5(f(0) + f(0.5)) = 0.5(0 + 0.5^3) = 0.0625.$$

(b) (3 points) Using lower sum with four rectangles:

$$0.25(f(0) + f(0.25) + f(0.5) + f(0.75)) = 0.25(0 + 0.25^3 + 0.5^3 + 0.75^3) =$$

$$0.25(0 + 0.015625 + 0.125 + 0.421875) = 0.25 \cdot 0.5625 = 0.140625.$$

(c) (2 points) Using upper sum with two rectangles:

$$0.5(f(0.5) + f(1)) = 0.5(0.5^3 + 1) = 0.5 \cdot 1.125 = 0.5625$$

(d) (3 points) Using upper sum with four rectangles:

$$0.25(f(0.25) + f(0.5) + f(0.75) + f(1)) = 0.25(0 + 0.25^3 + 0.5^3 + 0.75^3 + 1^3) =$$

$$0.25(0 + 0.015625 + 0.125 + 0.421875 + 1) = 0.25 \cdot 1.5625 = 0.390625.$$

10. (10 points) Note that the velocity is in m/sec while time is in minutes. To transform everything to minutes, we have to multiply everything by 60. We get the following answers:

(a) (5 points)

$$60 \cdot 5 \cdot (1 + 1.2 + 1.7 + 2.0 + 1.8 + 1.6 + 1.4 + 1.2 + 1.0 + 1.8 + 1.5 + 1.2) = 60 \cdot 5 \cdot 17.4 = 5220\, m.$$

(b) (5 points)

$$60 \cdot 5 \cdot (1.2 + 1.7 + 2.0 + 1.8 + 1.6 + 1.4 + 1.2 + 1.0 + 1.8 + 1.5 + 1.2 + 0) = 60 \cdot 5 \cdot 16.4 = 4920\, m.$$

12. (10 points) (a) (5 points) For simplicity, we use right endpoints:

$$0.001(40 + 62 + 82 + 96 + 108 + 116 + 125 + 132 + 137 + 142) = 0.001 \cdot 1040 = 1.04 \text{ miles.}$$

(b) (5 points) The halfway point was after about $1.04/2 = 0.52$ miles. Since

$$0.001(40 + 62 + 82 + 96 + 108 + 116) = 0.504,$$

the car reached halfway point after about 0.006 h=21.6 sec. It was going 116 miles per hour.