Solution 21.23

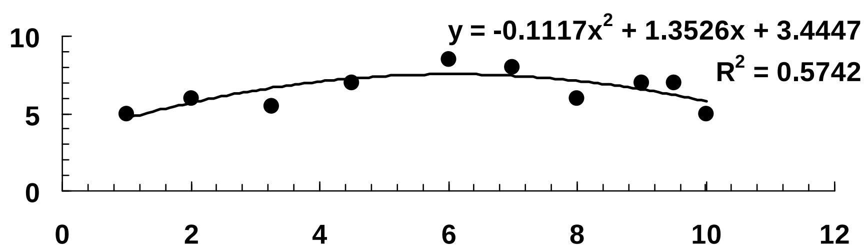
(a) Trapezoidal rule

$$I = (2-1)\frac{5+6}{2} + (3.25-2)\frac{6+5.5}{2} + \bullet\bullet\bullet = 60.375\frac{\text{m}\cdot\text{min}}{\text{s}} \times \frac{60\text{ s}}{\text{min}} = 3,622.5\text{ m}$$

(b) Trapezoidal/Simpsons rules

$$I = (2-1)\frac{5+6}{2} + (4.5-2)\frac{6+4(5.5)+7}{6} + (6-4.5)\frac{7+8.5}{2}$$
$$+ (9-6)\frac{8.5+3(8+6)+7}{8} + (10-9)\frac{7+4(7)+5}{6} = 59.9375\frac{\text{m}\cdot\text{min}}{\text{s}} \times \frac{60\text{ s}}{\text{min}} = 3,596.25\text{ m}$$

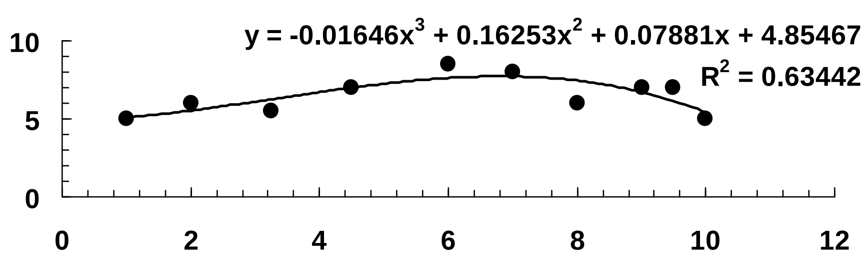
(c) We can use regression to fit a quadratic equation to the data



This equation can be integrated to yield

$$M = \int_1^{10} -0.1117x^2 + 1.3526x + 3.4447\, dx = \left[-0.03723x^3 + 0.6763x^2 + 3.4447x\right]_1^{10}$$
$$= 60.7599\frac{\text{m}\cdot\text{min}}{\text{s}} \times \frac{60\text{ s}}{\text{min}} = 3,645.594\text{ m}$$

We can use regression to fit a cubic equation to the data



Solution continued on the next page...

This equation can be integrated to yield

$$M = \int_1^{10} -0.01646x^3 + 0.16253x^2 + 0.07881\text{x} + 4.85467\, dx$$

$$= \left[-0.00412x^4 + 0.054177x^3 + 0.039405x^2 + 4.85467x \right]_1^{10}$$

$$= 60.56973 \frac{\text{m} \cdot \text{min}}{\text{s}} \times \frac{60\text{ s}}{\text{min}} = 3{,}634.184\text{ m}$$