Solution 21.23

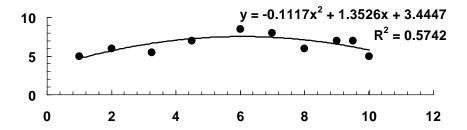
(a) Trapezoidal rule

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

(b) Trapezoidal/Simpsons rules

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

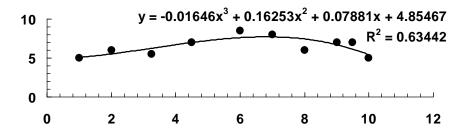
(c) We can use regression to fit a quadratic equation to the data



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...

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This equation can be integrated to yield

$$M = \int_{1}^{10} -0.01646x^{3} +0.16253x^{2} +0.07881x +4.85467 dx$$

$$= \left[-0.00412x^{4} +0.054177x^{3} +0.039405x^{2} +4.85467x \right]_{1}^{10}$$

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

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