Calculus Study Guide: section 5.5

One-dimensional motion: A particle moves along the a horizontal number line with velocity $v(t) = 26t - t^2$.

What is the total distance the particle travels on the time interval (0, 30)?

$$\int_0^{30} |v(t)| \, dt = 3158, 666$$

answer: _____

What is the displacement for the particle on (0, 30)?

$$\int_0^{30} v(t) \, dt = 2700$$

answer: _____

A snowstorm hits the town, and the rate of snowfall (in/hr) is given by $s'(t) = 2\sin\dfrac{\pi}{5}t$. The storm starts at t = 0 and last for 5 hours.

How much snow s does the storm drop on the town?

$$2 \int_0^5 \sin\frac{\pi}{5} \, dt = -2 \cdot \frac{5}{\pi} \cos \frac{\pi}{5} t \Big|_0^5$$

$$= -\frac{10}{\pi} \left(\cos \pi - \cos 0 \right) = -\frac{10}{\pi} \left(-1 - 1 \right) = \frac{20}{\pi} ''$$

answer: _____

t	0	1	4	5	7
v(t)	3	4	7	8	11

In the table above are data from a moving object. The time (in secs) is given in the first row, and the object's speed (in ft/s) is given in the second row. You want to estimate the distance that the object travels in the 7 minutes, using a right-endpoint approximation with 4 rectangles. Then find a left-endpoint approximation with 4 rectangles. Then average the left and right approximations. What is your estimate of the distance travelled (in feet)?

$$R_4 : \quad 1(4) + 3(7) + 1(8) + 2(11) = 55$$

$$L_4 : \quad 1(3) + 3(4) + 1(7) + 2(8) = 38$$

$$average = 46.5 \ ft$$

answer: _____