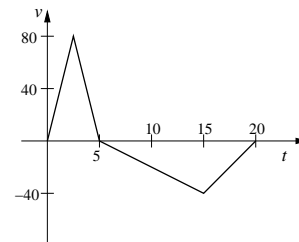


1. If the velocity of a fast-moving overly-verbose coffee-imbibing calculus professor is given (in ft/min) by the graph below, how far does the professor travel in the 20 min interval shown? When is the professor farthest from his starting point? (4 points)



2. Suppose that an alert calculus student estimates, for some $f(x)$, $\int_0^3 f(x) dx$, by using a left-hand sum and also by using a right-hand sum with the same number of intervals. She finds $\int_0^3 f(x) dx \approx 25.5$ with the left-hand sum and $\int_0^3 f(x) dx \approx 28.5$ with the right-hand sum. If $f(x)$ increases from $f(0) = 6$ to $f(3) = 12$, how many intervals did the student use for the two sums? (3 points)

3. It is well documented that students' love of calculus increases as time passes. If the rate (given in joy-filled moments per week) at which this love increases is shown in the following table, (a) express the number of joy-filled moments a calculus student may be expected to experience in the six-week interval shown as a definite integral, and (b) estimate this number. Be sure it is clear how you obtain your estimate. (3 points)

t (weeks)	0	2	4	6
$r(t)$ (jfm/wk)	3	9	17	32