

Eric and the Crowd

1. As Eric works out in the CCRB, a crowd begins to form to watch him. In the beginning, it's just one person, but thereafter the rate at which people arrive is .12 times the number of people already there. So if $N(t)$ is size of the crowd at time t ,

$$N(0) = 1 \quad \text{and} \quad N'(t) = .12N(t).$$

(It's OK for N to be a fraction, because sometimes people's attention is divided.)

- (a) Can you find a function N which matches those criteria?
- (b) The total amount of attention Eric receives is given in units of "person minutes". Write an integral that gives the total amount of attention Eric receives during the 20 minute workout.
- (c) Approximate the total attention using a left-hand sum and a right-hand sum, with 4 subintervals.
- (d) Average them to get the trapezoid sum. What can you say about which of your three approximations are underestimates, which are overestimates, and how do you know?
- (e) Find the exact amount of attention using the Fundamental Theorem of Calculus.