1. An engineer drives a car whose clock and speedometer work, but whose odometer is broken. On a 2-hour trip out of a congested city into the countryside she begins at a snail's pace, and as the traffic thins, she gradually speeds up. She notices that after traveling t hours her speed is $2t^2$ mph.
a) Divide the interval from $t = 0$ to $t = 2$ into 4 equal subintervals. Approximate the distance traveled in each subinterval. Assume her speed remains constant throughout each subinterval and is equal to her speed at the beginning of each subinterval. Sum your 4 approximations to get an estimate of the total distance traveled during the 2-hour trip.
b) Repeat part (c) assuming her speed remains constant throughout each subinterval and is equal to her speed at the end of each subinterval.

2. An office worker assembles advertising portfolios. As fatigue sets in the number of portfolios he can assemble per hour decreases. He is assembling $f(t) = 20 - t^2$ portfolios per hour t hours after he begins work.
a) How fast is he assembling portfolios 3 hours after he begins work?
b) How fast is he assembling portfolios 30 minutes after he begins work?
c) Divide the interval from $t = 0$ to $t = 3$ into 6 equal subintervals. Approximate the amount of work done in each subinterval using the formula Work = (Rate)(Time). For each approximation, assume the worker's rate of work remains constant throughout each subinterval and is equal to his rate of work at the beginning of each subinterval. Sum your 6 approximations to get an estimate of the total amount of portfolios he assembles in the first three hours of his shift.
d) Repeat part (c) assuming the worker's rate of work remains constant throughout each subinterval and is equal to his rate of work at the end of each subinterval.