Math 16B
Vogler
Applications of Definite Integrals

1.) A palm tree is growing at the rate of $\dfrac{15}{2t+3}$ ft./yr., where t is in years for $0 \leq t \leq 12$.

a.) What is the tree's growth rate when $t = 0$ years ?
b.) What is the tree's growth rate when $t = 9$ years ?
c.) What is the height of the tree at the end of the 12-year growth period ?

2.) You go on a bike ride. Assume your velocity at time t (hours) is $t \cdot \sqrt{t^2+3}$ miles/hour for $0 \leq t \leq 5$.

a.) What is your velocity when $t = 1$ hour ?
b.) What is your velocity when $t = 3$ hours ?
c.) What is the total distance traveled for $0 \leq t \leq 5$?

3.) Water is leaking from a large tank at the rate of $(1/4)t^2$ gal./hr., where t is given in hours for $t \geq 0$.

a.) What is the leakage rate when $t = 1$ hour ?
b.) What is the leakage rate when $t = 5$ hours ?
c.) What is the total amount of water which leaks from the tank for $0 \leq t \leq 6$?
d.) If the tank initially holds 100 gallons, how long will it take for the tank to become empty ?

4.) A thin wire lies along the x-axis from $x = 0$ to $x = 2\pi$ cm. It's density at x is given to be $3 + \sin 2x$ grams/cm.

a.) What is the wire's density at $x = 0$ cm. ?
b.) What is the wire's density at $x = \pi/4$ cm. ?
c.) What is the wire's density at $x = 7\pi/4$ cm. ?
d.) What is the total mass of the wire ?
e.) What is the mass of the wire from $x = \pi/2$ cm. to $x = \pi$ cm. ?