Section 1.1 Additional Problems

1. Frank opens an account at a bank.
   a. If the bank offers an effective annual rate of 4%, how long will it take for $500 to grow to $1,000?
   b. If the bank offers an effective quarterly rate of 1%, how long will it take for $500 to grow to $1,000?
   c. If it takes exactly 20 years for $500 to grow to $1,000, find the effective annual interest rate i.

2. Show that if $a(t)$ is differentiable and $a(s + t) = a(s) \cdot a(t)$ for every s and $t \geq 0$, then $a(t) = (1 + i)^t$ for some i. Use the definition of the derivative and $a(0) = 1$.