

1. a.

$$\frac{dA}{dt} = 0.06A \left( 1 - \frac{A}{200} \right)$$

$r = 0.06$ ,  $K = 200$ .

b. 79.83

c. 80.93; the second approximation is better

d. the equilibrium values are 0 and 200; unstable at 0, stable at 200.

4. a.  $r(0) = 3$  so increasing.

b. set  $r(t) = 0$  and solve for  $t$ :  $t = 3.75$

c.  $P(t) = P_0 e^{-0.4t^2 + 3t}$

d. declines to extinction

5. a.  $r(t) = 0.001t - 0.02$

b.

$$\frac{dP}{dt} = (0.001t - 0.02)P$$

c.  $P(t) = 100e^{0.001t^2/2 - 0.02t}$

d. increase with no bound.