

## Answers to Even-Numbered Exercises

### Exercises 9.1

4. (c)  
8. (picture not included)  
14. (a)  $y(0.3) \approx 1.0608$  (b)  $y(0.3) = e^{0.09} \approx 1.094$   
20. 6.90 billion

### Exercises 9.2

4. equilibrium solution  $y = 20$ , asymptotically stable  
10.  $y = 0$  is asymptotically stable  
12.  $y = 0$  is asymptotically stable,  $y = 9$  is unstable.  
16.  $y = -1$  and  $y = 1$  are asymptotically stable,  $y = 0$  is unstable  
22. (a)  $y = 6$  is the only equilibrium solution  
(b) asymptotically stable  
(c) If  $y(0) = 2$  then  $y(t)$  is increasing concave down  
If  $y(0) = 8$ , then is decreasing and concave up  
28. (a) equilibrium solutions are  $y = 0$  and  $y = 3$   
(b)  $y = 0$  is asymptotically stable,  $y = 3$  is unstable  
(c) If  $y(0) = -1$ , then  $y(t)$  is increasing and concave down  
If  $y(0) = 2$  then  $y(t)$  is decreasing, concave down and changes to concave up when  $y = 1.5$   
If  $y(0) = 5$  then  $y(t)$  is increasing and concave up  
44. (a)  $w = 150$   
(b) (picture not included)  
(c) approximately be 157.67 pounds

### Exercises 9.3

2. (a)  $\frac{dk}{dt} = 0.3k^{0.3} - 0.1k$   
(b)  $3^{1/0.7} \approx 4.804$   
(c)  $(0.9)^{1/0.7} \approx 0.8603$   
(d) the equilibrium solution  $k = 3^{1/0.7}$  is asymptotically stable  
(e)-(f) (not included)  
4. (a)  $k = 9$  is stable (b)  $k(1) \approx 1.204$  (c)  $k(1) = [3 - 2e^{-0.05}]^2 \approx 1.205$