

MATH 111 AUTUMN 2011  
FINAL EXAM ANSWERS

1. (a) approximately 35 thousand dollars  
(b) approximately 8.33 dollars per gumball machine  
(c)  $q \approx 2.5$ , 8.5 thousand gumball machines  
(d)  $q \approx 9.7$  thousand gumball machines
2. (a) approximately 1.16 dollars per plug  
(b) approximately 0.42 dollars per plug  
(c) approximately 25 thousand dollars  
(d) approximately 120 thousand plugs
3. (a) 209 lifts  
(b) 92,000 dollars  
(c) 1,060 dollars  
(d) 295 dollars
4. (a)  $t = 8.836$ , 21.164 hours  
(b)  $t = 15$   
(c) from  $t = 11.5$  to  $t = 14.5$
5. (a) 5.32 years  
(b) \$121,804.08  
(c) 6.20%  
(d) \$4,436.59  
(e) 0.0374  
(f) \$1.12  
(g) \$3,560.26  
(h) 1,402,961 bacteria
6. (a) Alice  
(b) Cecelia  
(c) 11.43%  
(d) 39 years