Name:
Functions and Change Solutions
Math 151, Applied Calculus
Section 1.3 – 1,2,5,7,8,10,16,20,23,57,61

1. Concave down

2. Concave up

5. The function is decreasing. The rate at which the function is decreasing is itself decreasing so the function is concave up.

7. The function is increasing and concave up between D and E, and between H and I. It is increasing and concave down between A and B, and between E and F. It is decreasing and concave up between C and D, and between G and H. Finally, it is decreasing and concave down between B and C, and between F and G.

8. Average rate of change is $\dfrac{f(3)-f(1)}{3-1} = \dfrac{18-2}{2} = 8$

10. When $t = 0$, we have $B = 1000(1.02)^0 = 1000$. When $t = 5$, we have $B = 1000(1.02)^5 = 1104.08$. We have an average rate of change of $= \dfrac{\Delta B}{\Delta t} = \dfrac{1104.08-1000}{5-0} = 20.82 dollars/year.$

16. (a) -0.35 billion dollars (b) 0.313 billion dollars (c) The average rate of change was negative from 2014to 2015, when sales decreased.

20. (a) The value of imports was higher in 2015 than 2001. (b) 0.1 trillion dollars per year or 100 billion dollars per year.

23. 10.286 cm/sec.

57. (a)

t(years since 2008)	0	0.25	0.5	0.75
GDP growth rate (% per year)	3.8	0.8	-7.8	-4.7

(b) Yes, since the relative growth rate was negative in the last two quarters of 2008, the GDP decreased then, and the economy was in recession.

61. (a) Relative change in price of candy is 0.25 (b) Relative change in quantity of candy sold -0.12. (c) The ratio of the relative changes (in absolute values) is 0.48 so for a 1% increase in a \$1 candy the quantity sold drops by 0.48%.