Calculus H – Unit 1 – Functions Review
Homework # 2: 1.1 Exercises p. 10-13 # 18, 62, 64, 65, 67, 76

Work on separate paper, show all your work to support your answers.

18. World record free fall On October 14, 2012, Felix Baumgartner stepped off a balloon capsule at an altitude of 127,852.4 feet and began his free fall. It is claimed that Felix reached the speed of sound 34 seconds into his fall at an altitude of 109,731 feet and that he continued to fall at supersonic speed for 30 seconds until he was at an altitude of 75,330.4 feet. Let $f(t)$ equal the distance that Felix had fallen t seconds after leaving his capsule. Calculate $f(0)$, $f(34)$, $f(64)$, and his average supersonic speed $\dfrac{f(64) - f(34)}{64 - 34}$ (in ft/s) over the time interval $[34, 64]$.
(*Source:* http://www.redbullstratos.com)

62–68. Working with difference quotients *Simplify the difference quotient* $\dfrac{f(x + h) - f(x)}{h}$ *for the following functions.*

62. $f(x) = 10$

63. $f(x) = 3x$

64. $f(x) = 4x - 3$

65. $f(x) = x^2$

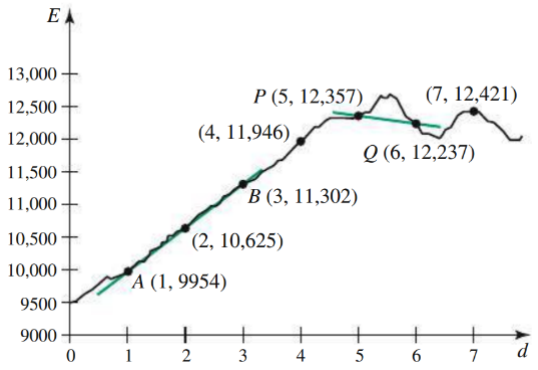
66. $f(x) = 2x^2 - 3x + 1$

67. $f(x) = \dfrac{2}{x}$

68. $f(x) = \dfrac{x}{x + 1}$

76. Elevation vs. Distance The following graph, obtained from GPS data, shows the elevation of a hiker as a function of the distance d from the starting point of the trail.

a. Find the slope of the secant line that passes through points A and B. Interpret your answer as an average rate of change over the interval $1 \le d \le 3$.

b. Repeat the procedure outlined in part (a) for the secant line that passes through points P and Q.

c. Notice that the elevation function is nearly constant over the segment of the trail from mile $d = 4.5$ to mile $d = 5$. Give a plausible explanation for the horizontal line segment.