MA 160
Section 1.3 Linear Models and Rates of Change

1. A company that produces snowboards has seen its annual sales increase linearly. In 2005, it sold 31,300 snowboards, and it sold 38,200 snowboards in 2011.

a) Suppose you want to describe this situation with a linear function. What two variables will you use? Which variable is the independent variable (input) and which variable is the dependent (output) variable?

b) Draw two axes, labeling them with your variable names from part a). You do not need to put a scale on your axes. Then plot and label the two points you were given, drawing a line between the two points.

c) Recall that the slope of a line between two points is given by $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{change in output}}{\text{change in input}}$

Calculate the slope of your line, and interpret it as a rate of change.

2. As dry air moves upward, it expands and cools. Suppose that the ground temperature is 20°C and the temperature at a height of 1 km is 10°C.

a) You want to describe this situation with a function. Determine the input and output variables, draw and label two axes, then plot and label the two points you were given.

b) Determine the slope of the line between your two points, and interpret the slope.

c) Use the point-slope form of the equation of a line $y - y_1 = m(x - x_1)$ or use the slope-intercept form of the equation of a line $y = mx + b$ to find a linear equation for your function.

d) Use your equation to determine the air temperature at an elevation of 2.5 km.