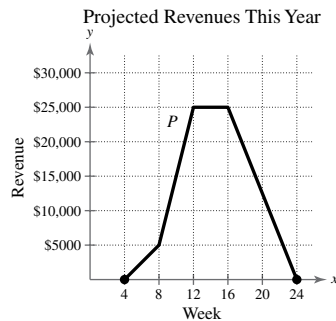
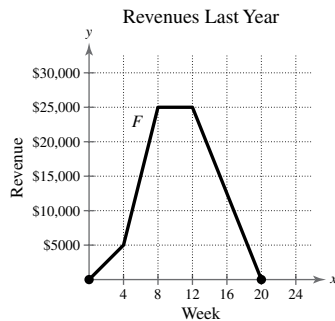


## Collaborative Project – Functions and Their Graphs

- You are a plow truck operator for a snow removal company. Your weekly hours are based on weather conditions. You earn \$30 per hour for up to 40 hours and you are limited to at most 10 hours of overtime at one and one-half times your base pay rate.
  - Write and graph a piecewise-defined function  $E(x)$  that gives your earnings  $E$  for working  $x$  hours in one week.
  - Find your weekly earnings when you work 35 hours and when you work 50 hours.
  - Find and interpret the slope of each segment of the graph of  $E(x)$ .
  - Find and interpret the intercepts of the graph of  $E(x)$ .
  - You earn \$1515 in one week. How many hours did you work?
- Your company orders a load of rock salt at a price of \$85 per ton. There is a delivery charge of \$95 and sales tax of 7%.
  - Explain what the function  $d(x) = 85x + 95$  represents.
  - Write a function  $c(x)$  for the total cost of an amount of  $x$  dollars with a 7% tax added.
  - Find and interpret  $(d \circ c)(x)$  and  $(c \circ d)(x)$ .
  - There is no tax on the delivery fee. Find your company's total cost for 13 tons of salt.
- The graph of function  $F$  shows the approximate weekly revenues  $y$  of your company from last year. The graph of function  $P$  shows your company's projected weekly revenues  $y$  for this year. In each graph,  $x$  represents the week, with  $x = 0$  corresponding to the first full week in October.



- Seasonal weather forecasts were used to create  $P$ . What can you conclude about these forecasts? Use the concepts of transformations of graphs to write  $P$  in terms of  $F$ .
  - Determine the open intervals on which the function  $P$  is increasing, decreasing, or constant.
  - Find the domain of each function.
- Your company purchases a truck for \$60,000 that is worth \$22,800 after 6 years. Find the average rate of change. Then write a linear function  $f(x)$  for the value  $f$  of the truck after  $x$  years. Find the inverse function  $f^{-1}(x)$  of  $f$ . Then find and interpret  $f^{-1}(35,200)$ .