Calculus in Action

part 2

1. The demand for tickets to an amusement park is given by $p = 70 - .02q$, where p is price of a ticket in dollars and q is the number of people attending at that price.

   (a) What price generates an attendance of 3000 people?

   (b) What is the total revenue when the attendance is 3000 people?

   (c) What is the total revenue if the price is \$20?

   (d) Write the revenue function as a function of attendance, q, at the amusement park.

   (e) What attendance maximizes revenue?

   (f) What price should be charged to maximize revenue?

   (g) What is the maximum revenue?

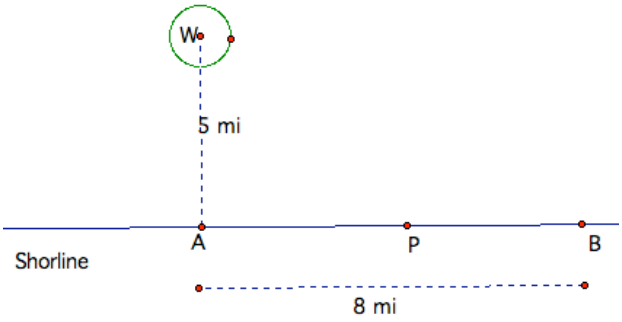
2. The demand equation for a quantity q of a product at price p in dollars, is $p = -5p + 4000$. Companies producing the product report the cost, C, in dollars, to product a quantity q is $C = 6p + 5$ dollars.

   (a) Express a company's profit, in dollars, as a function of q.

   (b) What production level earns the company the largest profit?

   (c) What is the largest profit possible?

3. An offshore oil well is located in the ocean at a point W, which is 5 miles from the closest shorepoint A on a straight shoreline. The oil is to be piped to a shorepoint B that is 8 miles from A by piping it on a straight line under water from W to some shorepoint P between A and B ad then on to B via a pipe along the shoreline. If the cost of laying pipe is \$100,000 per mile under water and \$75,000 per mile over land, where should the point P be located to minimize the cost of laying the pipe?



4. Two particles, A and B, are in motion in the xy-plane. Their coordinates at each instant of time t ($t \geq 0$) are given by $x_A = t$, $y_A = 2t$, $x_B = 1 - t$, and $y_B = t$. Find the minimum distance between A and B.