mile. Through the woods north of the road the cost is \$13 per mile.
(*a*) Find the most economical route; that is, where should John start angling through the woods?
(*b*) Make appropriate comments on the domain of definition of the function which rule out the possibility that x may be negative.

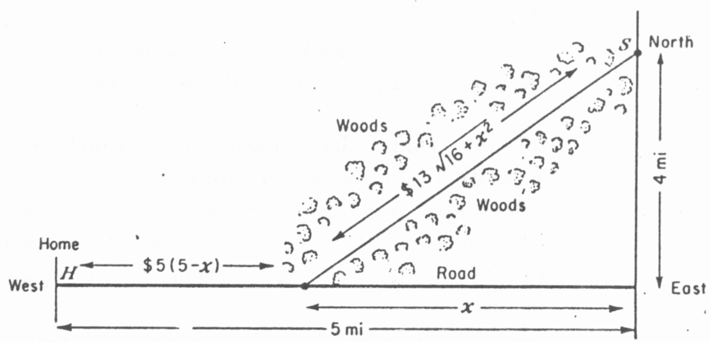

Figure 5-1

25. Rework Prob. 24 if the costs are \$40 and \$50 per mile, respectively.
26. (*a*) Rework Prob. 25 if the costs are \$5 per mile along the road and \$50 per mile through the woods.
(*b*) \$50 per mile along the road and \$30 per mile through the woods.
27. The intensity of light at any point varies inversely as the square of the distance between the point and the center of the light source. Two lights A and B are 6 ft apart. Light A has an intensity six times as great as that of light B.
(*a*) How far from A on line segment AB is the intensity least?
(*b*) Light A is 6 in. in radius and light B 4 in. in radius, and the point may not be taken inside of these radii. Where on line AB is the light intensity greatest?
28. Find the equation of the line tangent to $y^2x^3 - 4x^2y^2 + 7xy^3 = 6$ at (2,1).

In Probs. 29 to 33, use the rule $\dfrac{d(u/v)}{dx} = \dfrac{v\dfrac{du}{dx} - u\dfrac{dv}{dx}}{v^2}$ derived in Prob. 14, Set 5-3, to determine the derivative of the given function.

29. $f(x) = \dfrac{(2x-1)^2}{x^2 - x}$. (See Prob. 5, Set 5-1.)

30. $g(x) = \dfrac{x^3}{\sqrt[3]{2x-1}}$. (See Prob. 6, Set 5-1.)

31. $h(x) = \dfrac{\sqrt{4x-5}}{(2x+7)}$. (See Prob. 9, Set 5-1.)

32. $\dfrac{x-3}{2x+3}$.

33. $\dfrac{\sqrt{5x+7}}{\sqrt[3]{2x+9}}$.

5-5. Self-test

1. Describe, in words, the exact nature of the "extensions of previous theorems" made in this chapter.
2. Determine $\dfrac{dy}{dx}$ where
(*a*) $y = \sqrt{4x-3}$.
(*b*) $y = (\sqrt{x^2 - 5x + 1})^3 \sqrt[4]{(2x-3)^5}$.
(*c*) $2xy = 5$.
3. Let $u = u(x)$ and $v = v(x)$ be differentiable functions of x. Using the formula for the derivative of a product, derive the formula for

$$\frac{d(u/v)}{dx} = \frac{d(u \cdot v^{-1})}{dx}.$$

4. Sketch the curve $y = \dfrac{\sqrt{4+x^2}}{x^2 - 9}$, showing all maximum and minimum points as well as approximate intercepts.
5. Determine the slope of $y = 3\sqrt{2x+1} \cdot (5x-4)^{\frac{1}{3}} + 17$ at that point where the curve crosses the line $x = 4$.