Sec 3.1 Quadratic Applications

The height of a punted football, f(x), in feet, can be modeled by
$f(x) = -.01x^2 + 1.18x + 2$ where x is the ball's horizontal distance, in feet, from the point of impact with the kicker's foot.

What is the maximum height of the punt and how far from the point of impact does this occur?

How far must the nearest defensive player, who is 6 feet from the kicker's foot, reach to block the punt?

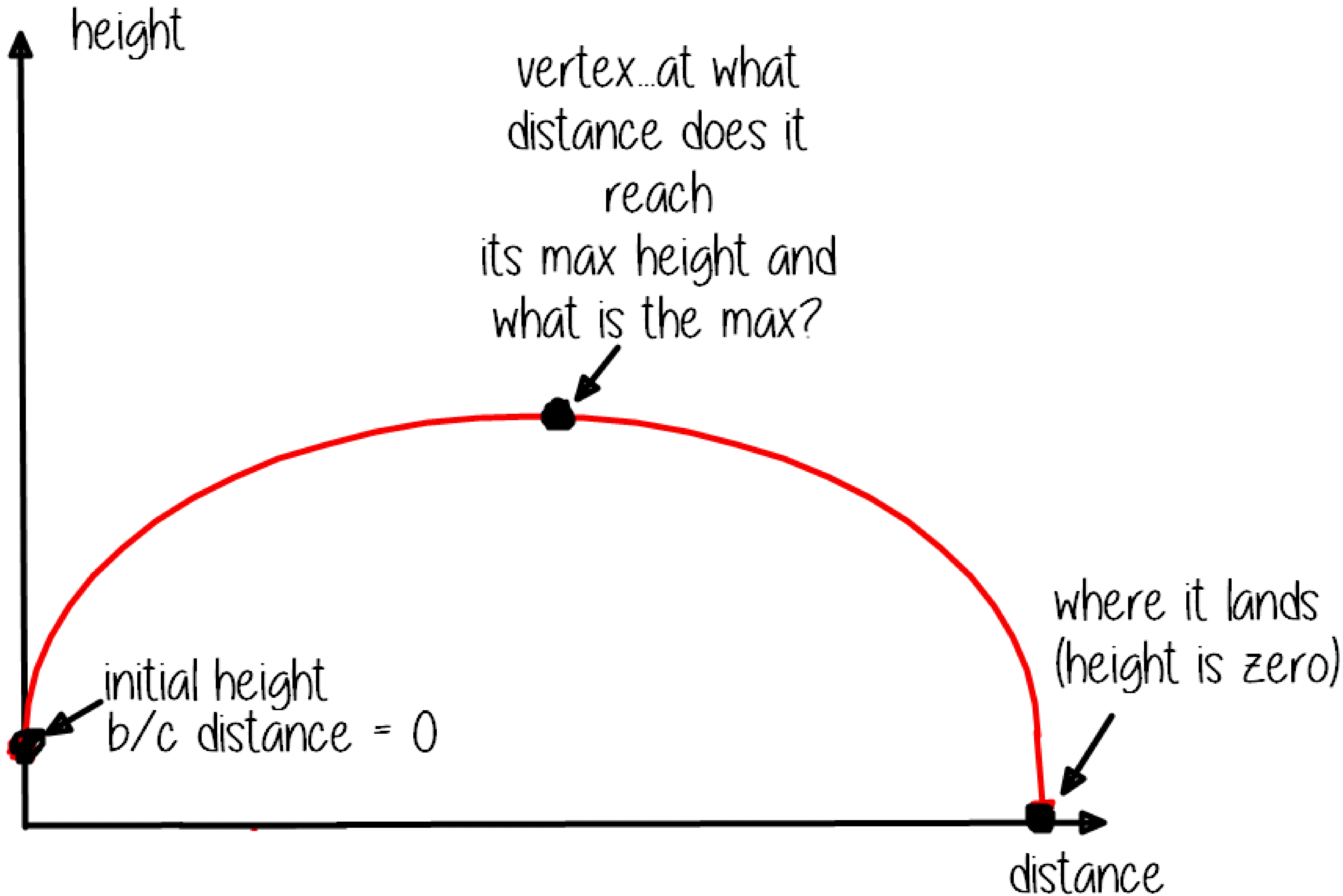
$$x = \frac{-1.18 \pm \sqrt{1.39 + .08}}{-.02}$$

If it's not blocked, how far does it travel?

$$0 = -.01x^2 + 1.18x + 2$$

$$\frac{-1.18 \pm 1.21}{-.02} \rightarrow 119.5$$

$$\approx 119.5 \text{ ft}$$


height
vertex...at what distance does it reach its max height and what is the max?
initial height b/c distance = 0
where it lands (height is zero)
distance

Among all pairs of numbers whose difference is 10, find a pair whose product is as small as possible. What is the minimum product?

1. Write equation
2. Write equation
3. Substitute
4. Solve

Minimize product.... $P = ab$

We also know that
$a-b = 10$
Isolate a variable...
Substitute...

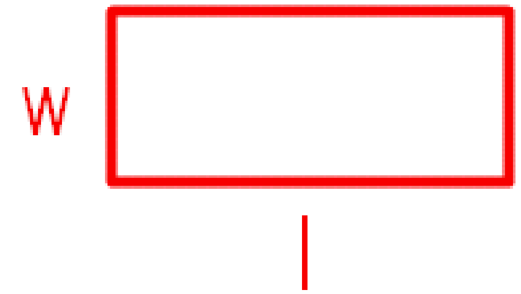
$$a-b=10$$
$$a=10+b$$

*one number is -5
*other is 5

$$P=(10+b)b$$
$$P=b^2+10b$$
$$x_v=\frac{-10}{2(1)}=-5$$
$$P=-5(5)=-25$$

You have 100 yards of fencing to enclose a rectangular region. Find the dimensions of the rectangle that maximize the enclosed area. What is the maximum area?

Again, write 2 equations. Isolate a variable. Plug into equation that needs to be max/min'd.



$\rightarrow P = 2l + 2w$

*maximize area... $a = lw$

$$a = w(50 - w)$$

$$a = -w^2 + 50w$$

$$w_v = \frac{-50}{2(-1)} = 25$$

$$100 = 2l + 2(25)$$

$$50 = 2l$$

$$25 = l$$

$$A = lw = 25(25)$$

$$= 625 \text{ ft}^2$$

Suggested Practice
Sec 3.1
pages 344-345
57, 59ab,61,63,65

57a. 18.35ft
35ft

57b. 77.8ft

57c. 6.1ft

59a. 7.8 ft
1.5 ft

59b. 4.6ft

61. 8 and 8
64

63. 8 and -8 → -64

65.
300 x
150
max
area
=
45,000
ft^2