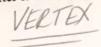
The height h in feet of a baseball t seconds after it is hit can be modeled by the function $h(t) = -16t^2 + 96t + 3$.

a. Find the maximum height of the baseball.



VERTEX
$$-\frac{b}{2a} = \frac{-96}{2(-16)}$$

maximum height occurs [maximum height = 147 feet after 3 seconds h(3) = -16(32) +96(3) +3

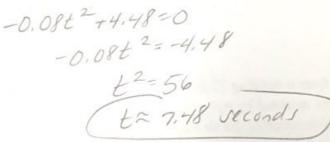
b. How long does the ball take to hit the ground?

0=-16

E= -96+ \ 962-4(-16)(3)

t = -96 + 19408 = -0.03 1 seconds

- C=3
 Additional Practice
- 1. The quadratic function that approximates the height of a javelin thrown $h(t) = -0.08t^2 + 4.48$, where t is the time in seconds after it is thrown and h is the javelin's height in feet. How long will it take for the javelin to hit the ground?



2. a. Marilyn hit a golf ball on the ground with her driver. Use the general function for a projectile to write a function that shows the height in feet of her golf ball as a function of time. The ball was hit with an initial vertical velocity of 100 feet per second.

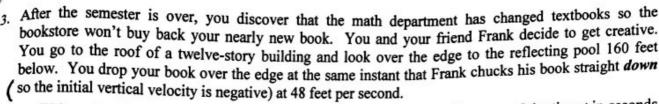
$$h(t) = -16t^2 + 100t$$

b. How long will Marilyn's golf ball stay in the air?

-1182+100£=0

-16t(t-25)=0

(t=6.25 seconds



a. Write a function h in standard form for your book's height in feet in terms of the time t in seconds after the book is dropped.

b. Write a function f in standard form for the height of Frank's book in terms of the time t in seconds after the book is "chucked".

c. By how many seconds does his book beat yours into the water? Show your work to justify your answer.

answer.

$$-16t^{2} + 160 = 0$$

$$-16t^{2} = -160$$

$$t^{2} + 3t - 10 = 0$$

$$t^{2} = 10$$

4. The height h(t) measured in feet of an object dropped by an astronaut on the moon can be approximated by $h(t) = h_0 - 2.7t^2$, where h_0 is the height from which the object was dropped. About how long would it take an object to fall to the surface of the moon (h = 0) if it were dropped by an astronaut from a height of 6 feet?

$$6-2.7t^{2}=0$$

$$-2.7t^{2}=-6$$

$$t^{2}=2.\overline{2}$$
 $t=1.49$ seemeds

5. The height h in feet of a baseball t seconds after it is hit can be modeled by the function $h(t) = -16t^2 + 80t + 2$.

a. Find the maximum height of the baseball.
$$-80$$

$$2(-16) = 2.5$$
b. How long does the ball take to hit the ground?

$$h(t) = -16t^2 + 80t + 2.$$

$$2(-16) = 2.5$$

$$102 \text{ feet}$$

$$\begin{aligned}
&-16t^{2}+80t+2=0 \\
& t = -80^{\frac{1}{2}} \sqrt{80^{2}-4(-16)(2)} \\
& = -2(-16)
\end{aligned}$$

$$\begin{aligned}
& t = -80^{\frac{1}{2}} \sqrt{6272} \\
& = 0.025 \text{ seconds}, \quad 4.975 \text{ seconds}
\end{aligned}$$

A juggler tosses a ball into the air. The ball leaves the juggler's hand 4 feet above the ground and has an initial vertical velocity of 30 feet per second. The juggler catches the ball when it falls back to a height of 3 feet. How long is the ball in the air?

-16t2+30t+4=3 -1622+30t+1=0 h(t)= -142+362+4 a. What if the ball leaves the juggler's hand with an initial vertical velocity of 40 feet per second?

How long is the ball in the air?

£= -40± \$462-4(-16)(1) -16t2+40++4=3 -16+2+40++1=0

t= -40 = 1664 - -0.025 A lacrosse player throws a ball in the air from an initial height of 7 feet. The ball has an initial vertical

velocity of 90 feet per second. Another player catches the ball when it is 3 feet above the ground. How long is the ball in the air?

 $h(t) = -16t^2 + 90t + 7$ -16+2+90E+7=3 -16+2+90+ +4=0 $t = -90^{\pm}\sqrt{90^2 - 4(-16)(4)} = -90^{\pm}\sqrt{8356}$ -32-0.044 (5,67 seconds