**MAT 011** **TUTORIAL FOR PROJECT #1**

**A.** Suppose you have a swimming pool in your backyard. At 4 pm the volume of the water in the pool is 1837.68 cubic feet. From 4 pm to 9 pm, assume it rains steadily and the water volume in the pool increases by 82.50 cubic feet per hour.

If  corresponds to the number of hours elapsed since 4 pm, we can fill in the table below with the appropriate x-values.

Actual Time 4 pm 5 pm 6 pm 7 pm 8pm 9pm

*x*-value 0 1 2 3 4 5

We can determine the volume in the swimming pool after each hour of rain because we know that with each passing hour, the volume increases by 82.50 $ft^{3}$.

|  |  |
| --- | --- |
| *x* | *V* (volume) |
| 0 | 1837.68  |
| 1 | 1920.18  |
| 2 | 2002.68  |
| 3 | 2085.18  |
| 4 | 2167.68  |
| 5 | 2280.18  |

$+ 82.50 ft^{3}$ We add this volume because it is increasing.

We continue to add 82.50 $ft^{3}$ for each hour that elapses.

$+ 82.50 ft^{3}$

We now need to create a formula that gives the new volume of water in the pool in cubic feet for each hour that it rains after 4 pm.

The total volume of the swimming pool **is** 1837.68 $ft^{3}$ **plus** $ 82.50 ft^{3}$ **times** the number of hours after 4 pm.

$$ V = 1837.62 + 82.50x$$

So our equation is $V=1837.62 + 82.50x$.

We can now use this equation for solving purposes. For example, at what time will the volume in the swimming pool equal 2126**.**37 $ft^{3}$?

We know that $V=2126.37.$ We substitute this into our equation and solve for the missing variable,

$$2126.37 =1837.62 +82.50 x$$

 – 1837.62 – 1837.62

 288.75 = 82.50*x*

82.50 82.50

 *x* = 3.5

So 3.5 hours after 4 pm is when the swimming pool will reach the given volume. Thus, the answer is **7:30 pm**.

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**B.** Suppose your swimming pool is circular and has a diameter of 12.5 feet. The volume of the water in the pool can be approximated by the volume of a cylinder, which is given by

r

V= volume

r =radius

h = height

  

h

If the height of the water in the swimming pool is 3.6 feet, then the volume of water the pool currently has is

.

**NOTE:** Please use the pi key on your calculator, 2nd ^, NOT 3.14.

If the volume of water has increased by 4% due to the rainfall, then we can determine the difference in volume of water in the pool caused by the rainfall.

“The difference in volume is 4% of the original volume of water in the pool before the rain.”

 

Thus, the **change in volume is **.

\* We note that the **surface area of the swimming pool is .**

The change in height of the water in the pool can be approximated by taking the **change in volume divided by the surface area of the pool**:

 .

To have a better visualization of how much the water rose, we convert our answer to inches using dimensional analysis. *FACT: There are 12 inches in 1 foot.*

0.144  12 

 = 1.73 inches.

1. 1 

So the rainfall caused the pool to rise 1.73 inches.