Section 5.3 Polynomials and Polynomial Functions
Section 5.4 Multiplying Polynomials
Section 5.6 Factoring Trinomials

INSTRUCTOR NOTE

Evaluating polynomial expressions and functions using the graphing calculator is not a course objective; however, you may wish to use the calculator to confirm results found using "paper and pencil" methods.

1. Evaluating polynomial functions.

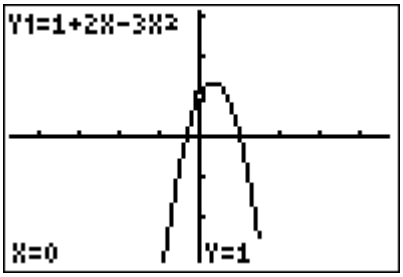
Example 1: Evaluate the function $P(x) = 1 + 2x - 3x^2$ for

a. $P(0)$

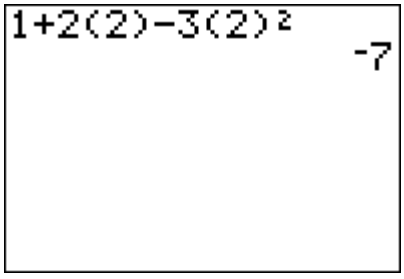
b. $P(2)$

c. $P(-1)$

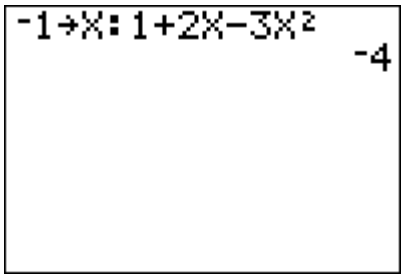
Solution: a. Using the graph of the polynomial function (VALUE feature in TRACE).



b. Using Home Screen substitution.



c. Using the STO key.

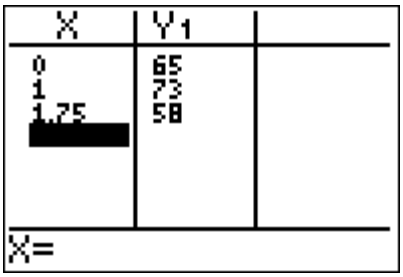


Example 2: An object is thrown upward with an initial velocity of 24 feet per second from the top of the 65-foot high CSCC parking garage. The height of the object at any time t can be described by the polynomial function $P(t) = -16t^2 + 24t + 65$. Find the height of the object at each given time.

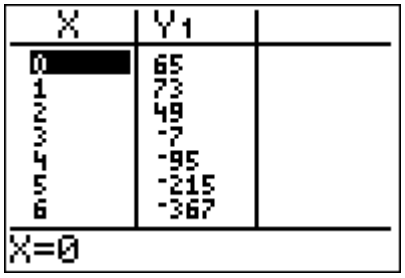
a. t = 0 seconds
b. t = 1 seconds
c. t = 1.75 seconds
d. Approximate (to the nearest tenth of a second) how long before the object hits the ground.

Solution: There are multiple ways to find these answers: home screen substitution, using the STO key, selecting the TABLE with Indpnt set on "Ask," or graphing the function and finding the answer from the graph. The "Ask" option is shown below.

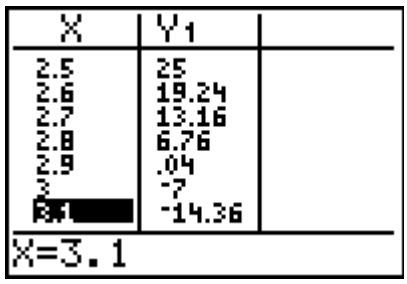
a – c.



d. The object will hit the ground when the height = 0. So we solve the equation $0 = -16t^2 + 24t + 65$. From the table above, or the table with Indpnt set on Auto, below, we see that the object hits the ground between 2 and 3 seconds after it was thrown.



Because we want the approximation to be to the nearest tenth of a second, show students how to change ΔTbl (the table increment) to 0.1, with TblStart at 2. Then scroll down through the table to find the value of x for which Y1 is close to zero.

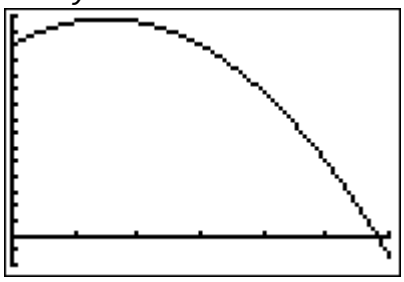


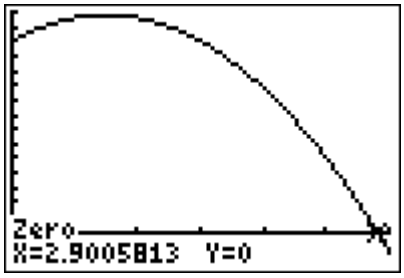
It can be seen that the object hits the ground after approximately 2.9 seconds.

INSTRUCTOR NOTE

You may choose to show the "zero" method for answering part (d), the question "Approximate (to the nearest second) how long before the object hits the ground."

If you do so, include a discussion of a suitable viewing rectangle, and the use of the "zero" method to find the *x*-intercept of the function: the value of *x* for which *y* = 0.





Viewing rectangle: [0, 3, 0.5] by [-10, 75, 5]

INSTRUCTOR NOTE

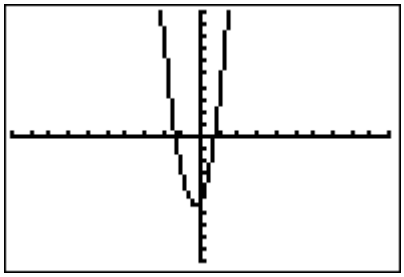
Verifying the answers to polynomial addition, subtraction, multiplication, and factorization is NOT a course objective. You may choose to include the topics below or not, at your discretion.

1. The calculator may be used to visualize addition, subtraction, multiplication, and factorization of polynomials in one variable.

   Example 3: Confirm that the difference of the polynomials

   $$\left(2x^2+5x-1\right)-\left(4+2x-3x^2\right)=5x^2+3x-5$$

Solution: Let Y1 = the left side of the equation, let Y2 = the right side of the equation, and graph the equations on the same screen to see if the graphs coincide.



Students can also scroll through the table to see that the corresponding ordered pair solutions are the same.

X	Y1	Y2
0	-5	-5
1	3	3
2	21	21
3	49	49
4	87	87
5	135	135
6	193	193

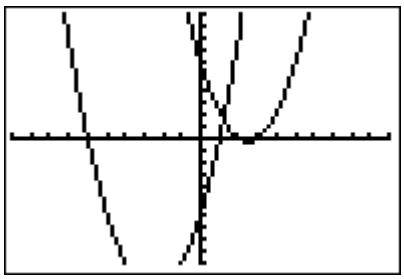
X=0

INSTRUCTOR NOTE

Although this is not "proof" that the answer is correct, it at least may provide students with an idea that their solution is reasonable.

Example 4: Is the polynomial correctly factored? $x^2 - 5x + 6 = (x + 6)(x - 1)$?

Solution:



No it's not! It should be $(x - 3)(x - 2)$.