Using INTERSECT to Approximate Solutions of an Equation

Instructions for the TI-84 Plus

Example: Find the solutions of the equation $5x^3 - 4x = 3x - 1$. Round the solutions to the nearest hundredth.

The instructions in this help sheet assume that you are familiar with graphing. If you need to review, please work through the help sheets *Preparing the Calculator for Graphing* and *Graphing an Equation*.

Enter the function editor by pressing [Y=]. Enter the left side of the equation into Y_1 by pressing [5] [X,T,Θ,n] [^] [3] [−] [4] [X,T,Θ,n] and enter the right side of the equation into Y_2 by pressing [3] [X,T,Θ,n] [−] [1]. The screen should look like the one shown in figure 1. To adjust your graphing window to the standard graphing screen and to graph Y_1 and Y_2, press [ZOOM] [6]. The graph is shown in figure 2.

Fig. 1

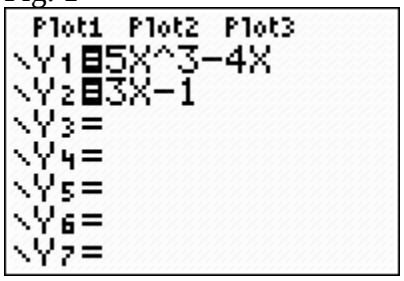
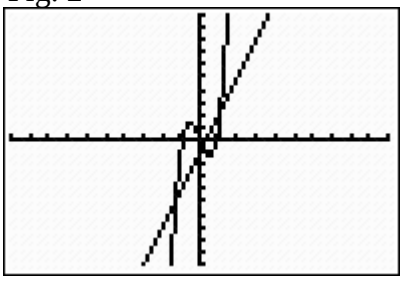


Fig. 2



To access the calculate menu, press [2nd] [TRACE] (shown in figure 3). Select INTERSECT by pressing [5]. The calculator will prompt you to set the First Curve (shown in figure 4).

Fig. 3

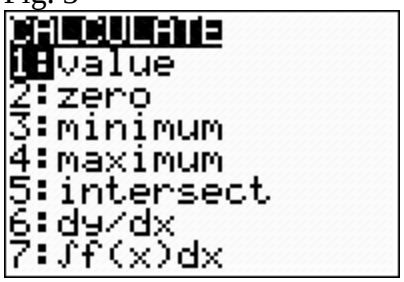
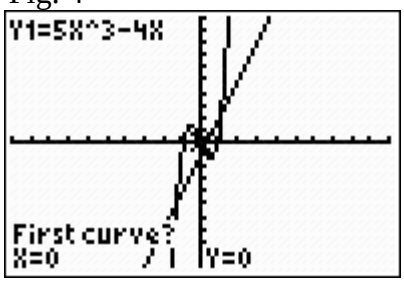


Fig. 4



Move the cursor closer to the leftmost intersection by pressing [◄] so that you can see the cursor clearly on a curve. The upper left part of the screen tells you that the cursor is on Y_1. Press [ENTER] to set this as the first curve (figure 5). Next it prompts you to set the second curve (figure 6). The calculator automatically moved to the next equation and is

showing you in the upper left corner of the screen that the cursor is on Y_2. Press ENTER to select this curve. You will be prompted to enter a Guess (figure 7). Place your cursor near the intersection that interests you and press ENTER. The result is shown in figure 8. You will see the intersection rounds to $x = -1.25$ and $y = -4.75$.

Fig. 5

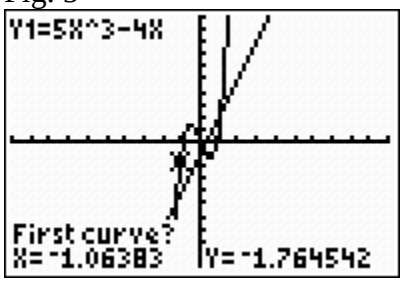


Fig. 6

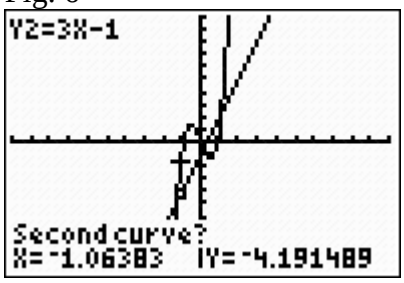


Fig. 7

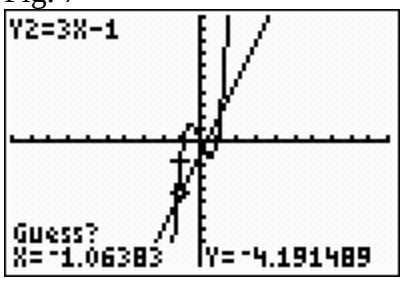
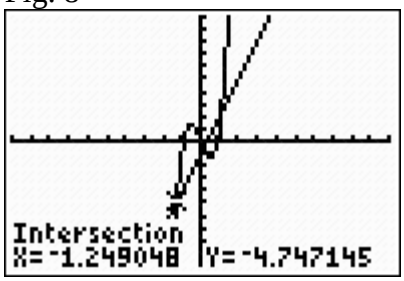


Fig. 8



The solution set to $5x^3 - 4x = 3x - 1$ contains the x-values where Y_1 and Y_2 intersect, so one of the solutions to $5x^3 - 4x = 3x - 1$ is $x = -1.25$.

Repeat the process to find the second solution. Press 2nd TRACE. Select 5 for intersection. Move the cursor closer to the middle intersection as shown in figure 9. Press ENTER to set the first curve. Press ENTER again to set the second curve. Press ENTER again to indicate that the cursor is near the desired intersection. Figures 9 through 12 illustrate this process. The resulting intersection point of $x = .15$ and $y = -.56$ is shown in figure 12. Therefore, another solution to $5x^3 - 4x = 3x - 1$ is $x = .15$.

Fig. 9

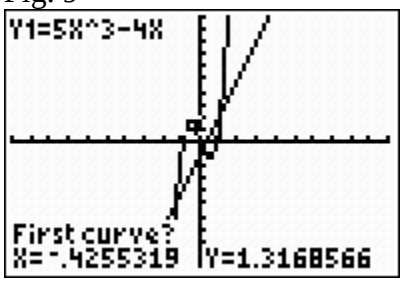


Fig. 10

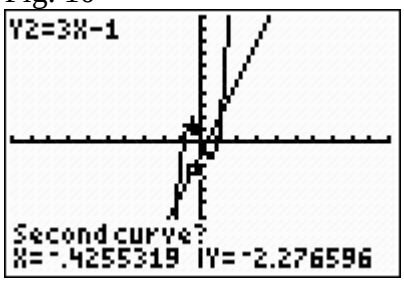


Fig. 11

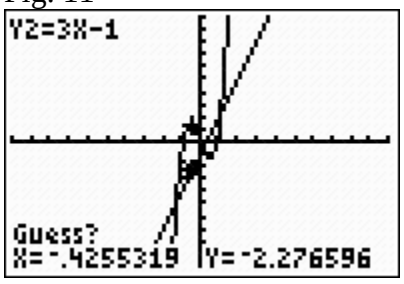
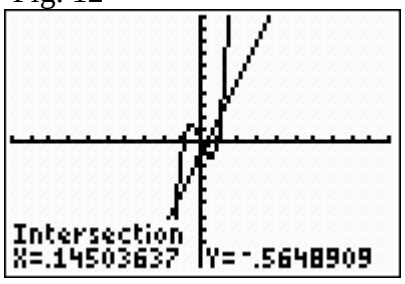


Fig. 12



Repeat the process one more time to find the third solution. Press 2nd TRACE. Select 5 for intersection. Move the cursor closer to the rightmost intersection as shown in figure 13. Press ENTER to set the first curve. Press ENTER again to set the second curve. Press ENTER again to indicate that the cursor is near the desired intersection. Figures 13 through 16 illustrate this process. The resulting intersection point of $x = 1.10$ and $y = 2.31$ is shown in figure 16. Therefore, another solution to $5x^3 - 4x = 3x - 1$ is $x = 1.10$.

Fig. 13

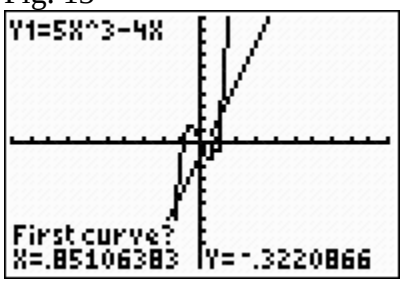


Fig. 14

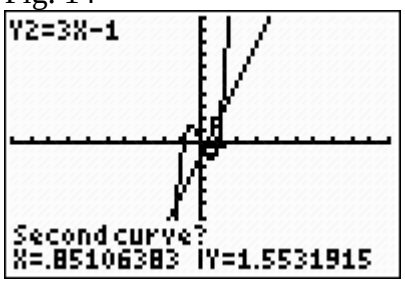


Fig. 15

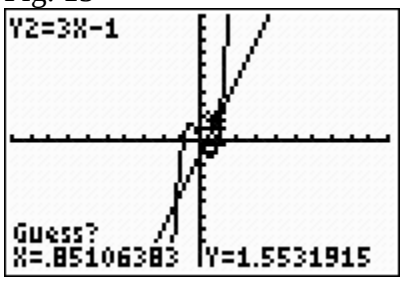
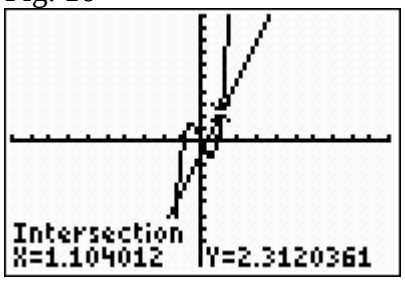


Fig. 16



Therefore, the three solution to $5x^3 - 4x = 3x - 1$ are the three x-values where Y_1 and Y_2 intersect. They are $x = -1.25$, $x = .15$, and $x = 1.10$.