



PEN-International 研·会  
教授·人大学生数学: NTID(美国 人技 学院) 模式

教授: Daniele & Carr

六月 2004

使用 TI-83 Plus 计算器来建立数学连接

一些我们将会使用到的 **KEYS** 键:

**ENTER** 用来完成计算和选择选项

**▼ ▲ ▶ ◀** 向下,上,右,左移动光标

**2nd** 在按黄色按键前所按

**ALPHA** 在按绿色按键前所按

**Y=** 输入方程

**X,T,θ,n** 输入快速的 X

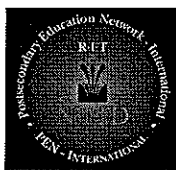
**$x^2$**  将一个数或变量平方

**ZOOM** 选择图窗口的一种方法

**TRACE** 观察曲线上的点

**2nd** [CALC] 显示找寻以下功能的计算目录:

- 根
- 交点
- 导数的数值



*A PEN-International Workshop*  
***Teaching Mathematics to Deaf College Students: The NTID Model***  
*Professors Daniele & Carr*  
*June 2004*

**Using the TI-83 Plus Calculator to Make Mathematical Connections**

Some of the KEYS we will use:

**ENTER** to complete a computation or make a selection

**▼ ▲ ► ◀** move the cursor down, up, right, left

**2nd** use before anything YELLOW

**ALPHA** use before anything GREEN

**Y=** to enter a function

**X,T,θ,n** to type the 'quick' X

**x<sup>2</sup>** squares a number or variable

**ZOOM** one way to choose a graphing window

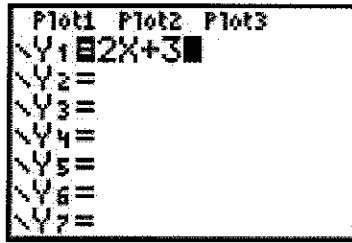
**TRACE** to see points on the curve

**2nd [CALC]** shows the calculate menu for finding:

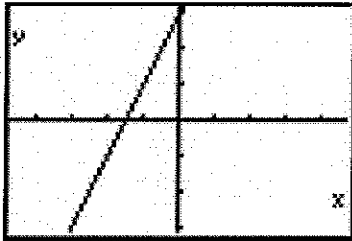
- Roots
- Points of intersection
- Numeric derivatives

例 1: 用 TI-83 Plus 来学习函数  $y = 2x + 3$

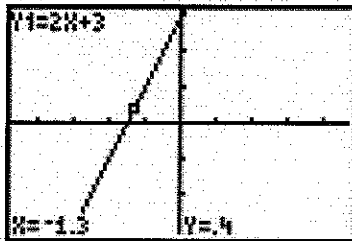
a. 按  $\boxed{Y=}$  并输入函数 Y1:



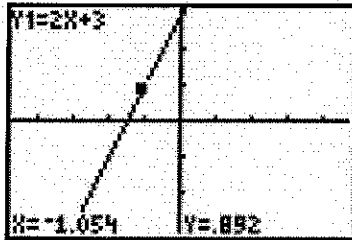
b. 按  $\boxed{ZOOM}$  并选择 4:Zdecimal



c. 按  $\boxed{TRACE}$  并使用左  $\boxed{\leftarrow}$  和右  $\boxed{\rightarrow}$  箭头来移动直线.



d. 输入数值 -1.054 并观察结果:

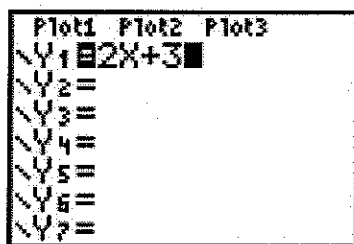


一些给学生的问題:

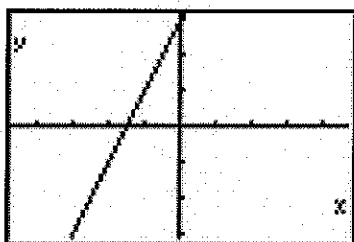
- 解释方程  $y = 2x + 3$  和数值对  $(-1.3, .4)$  的关系
- 使用  $\boxed{TRACE}$ , 解释线于坐标轴的垂直相交点.
- 用  $\boxed{TRACE}$ , 解释线于坐标轴的水平相交点.
- 当  $x = 1.0051$ ,  $y$  等于什么?

**EXAMPLE 1:** Use the TI-83 Plus to study the function  $y = 2x + 3$

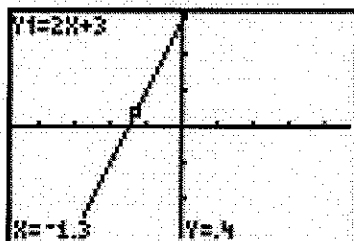
a. Press  $\boxed{Y=}$  and enter the function in Y1:



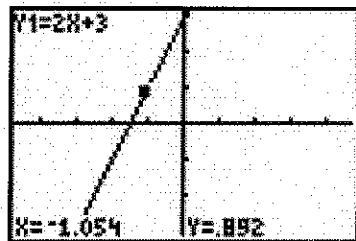
b. Press  $\boxed{ZOOM}$  and select 4:Zdecimal



c. Press  $\boxed{TRACE}$  and use the left  $\boxed{\leftarrow}$  and right  $\boxed{\rightarrow}$  arrows to move on the curve.



d. Enter the number -1.054 and see the result:



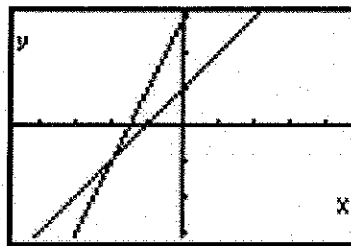
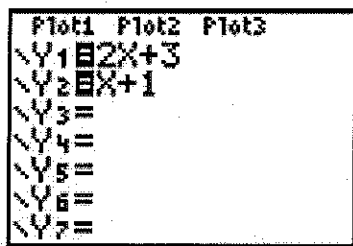
**Good questions for students:**

- Explain the connection between the equation  $y = 2x + 3$  and the ordered pair  $(-1.3, .4)$
- Using  $\boxed{TRACE}$ , determine the vertical intercept of the line.
- Using  $\boxed{TRACE}$ , determine the horizontal intercept of the line.
- When  $x = 1.0051$ , what is the value of  $y$ ?

例 2: 在 TI-83 上作  $y = 2x + 3$  和  $y = x + 1$  的图.

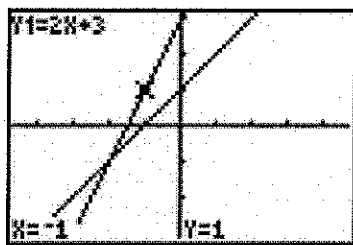
a. 按  $\boxed{Y=}$  并输入函数. 按  $\boxed{\text{GRAPH}}$  来看图.

b.



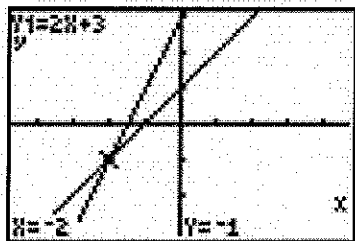
c. 按  $\boxed{\text{TRACE}}$  并移动光标左右.

利用四个方向键,  $\boxed{\downarrow}$ ,  $\boxed{\uparrow}$ ,  $\boxed{\rightarrow}$  和  $\boxed{\leftarrow}$ .



d. 你注意到  $\boxed{\downarrow}$ ,  $\boxed{\uparrow}$  键从一条线移到另一条线.

e. 移动光标到两线的交点,  $(-2, -1)$

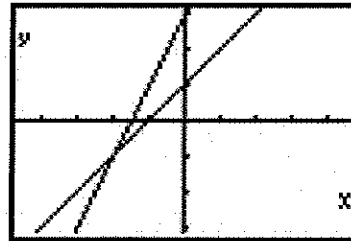
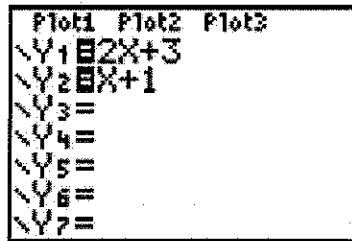


一些给学生的问題:

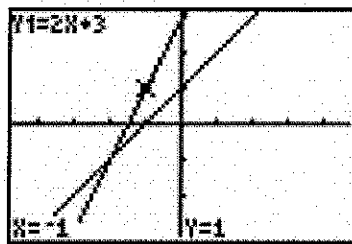
- 解释此图中的交点并提供解题  $2x + 3 = x + 1$  的方法
- 解释  $y = -1$  和  $2x + 3 = x + 1$  方程的联系.
- 用代数的方式解答  $2x - y = -3$  和  $x - y = -1$  方程. 解释为何结果和例 2 相同.

**EXAMPLE 2:** Graph both lines  $y = 2x + 3$  and  $y = x + 1$  on the TI-83.

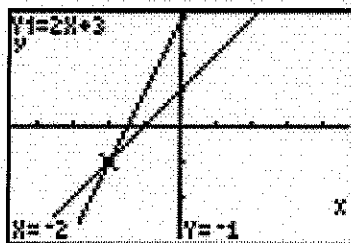
- Press  $\boxed{Y=}$  and enter both functions. Press  $\boxed{\text{GRAPH}}$  to see the graph.
- 



- Press  $\boxed{\text{TRACE}}$  and move the cursor around. Use all 4 arrows,  $\boxed{\downarrow}$   $\boxed{\uparrow}$   $\boxed{\rightarrow}$  and  $\boxed{\leftarrow}$ .



- You notice that the  $\boxed{\downarrow}$   $\boxed{\uparrow}$  arrows move from line to line.
- Move the cursor to the point of intersection,  $(-2, -1)$

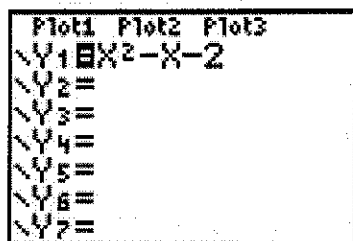


**Good questions for students:**

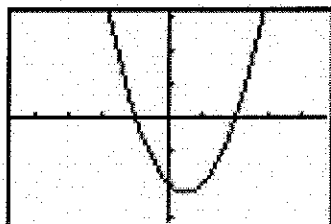
- Explain the connection between this graph and the solution to  $2x + 3 = x + 1$
- Explain the connection between  $y = -1$  on the graph and the equation  $2x + 3 = x + 1$ .
- Solve the system  $2x - y = -3$  and  $x - y = -1$  algebraically. Explain why the solution is the same as in Example 2 above.

例 3: 用 TI-83 Plus 来看  $y = x^2 - x - 2$  的图线.

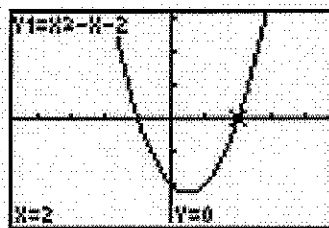
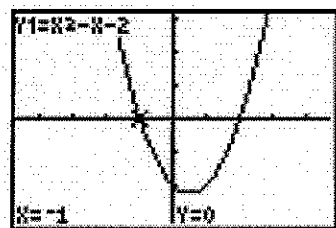
a. 按  $\boxed{Y=}$  并输入函数 Y1.



b. 按  $\boxed{ZOOM}$  并选择 4:Zdecimal



c. 按  $\boxed{ZOOM}$  并使用向左  $\boxed{\leftarrow}$  和向右  $\boxed{\rightarrow}$  箭头来决定水平交点.

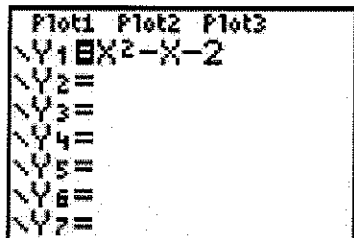


一些给学生的问題:

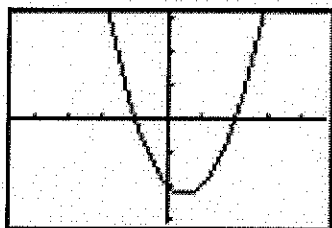
- 解决  $x^2 - x - 2 = 0$ . 这些答案是如何于水平交点相关联的?
- 计算两个 x-轴交点的平均值,  $x = -1$  和  $x = 2$ . 这个答案于曲线最低点有何关系?
- 这个函数的最小值是什么?

**EXAMPLE 3:** Use the TI-83 Plus to look at the graph of  $y = x^2 - x - 2$ .

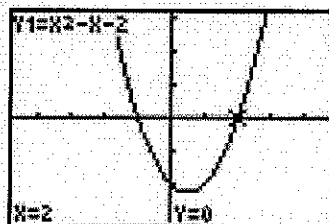
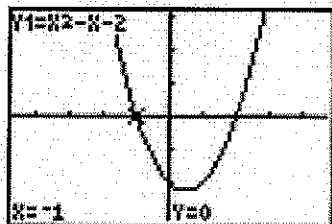
a. Press  $\boxed{Y=}$  and type the function in Y1.



b. Press  $\boxed{ZOOM}$  and select 4:Zdecimal



c. Press  $\boxed{ZOOM}$  and use the left  $\boxed{\leftarrow}$  and right  $\boxed{\rightarrow}$  arrows to determine the horizontal intercepts.



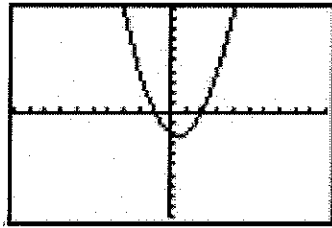
**Good questions for students:**

- Solve  $x^2 - x - 2 = 0$ . How are these answers connected to the horizontal intercepts?
- Find the average of the two x-intercepts,  $x = -1$  and  $x = 2$ . How is this answer connected to the minimum point on the curve?
- What is the minimum value of the function?

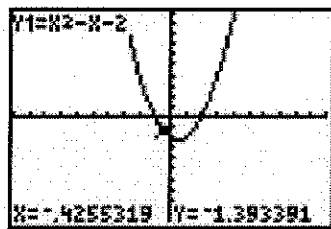


例 4: 使用其它窗口来观察下面函数的图  
 $y = x^2 - x - 2$ .

a. 按 **ZOOM** 并选择 **6:Zstandard**.

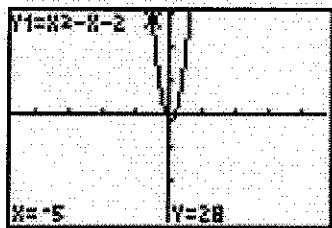


b. 用 **TRACE** 和 **▶◀** 来看坐标是如何被显示的.



(最多可显示 7 位)

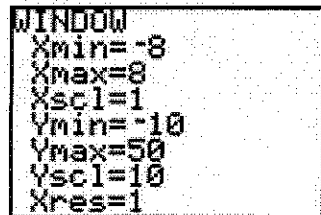
c. 按 **ZOOM** 然后选择 **8:Zinteger** 并按 **ENTER**. 用 **TRACE** 和 **▶◀** 来看坐标是如何显示的.



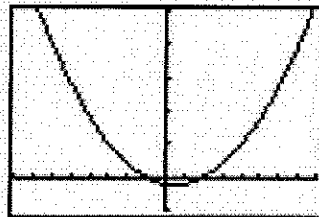
(x-值将是整数)

d. 设置你的观察窗口: 按 **WINDOW** 并输入下面数值.

然后按 **GRAPH**

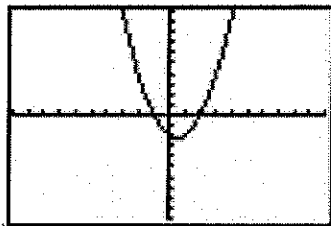


Press **GRAPH** :

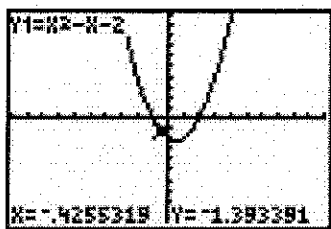


**EXAMPLE 4:** Try other viewing windows to look at the graph of  $y = x^2 - x - 2$ .

a. Press **ZOOM** and select **6:Zstandard**.

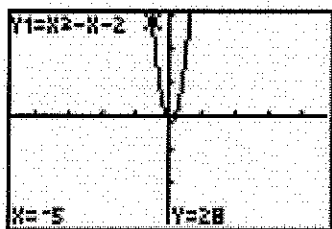


b. Use **TRACE** and **▶◀** to see how the coordinates are displayed.



(Up to 7 digits shown)

c. Press **ZOOM** then select **8:Zinteger** and press **ENTER**. Use **TRACE** and **▶◀** to see how the coordinates are displayed.



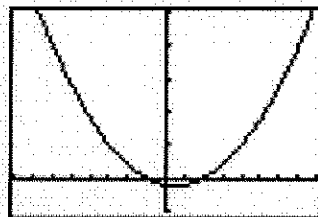
(The x-value will be an integer)

d. Set your own viewing window: Press **WINDOW** and enter these numbers below. Then press **GRAPH**

```

WINDOW
Xmin=-8
Xmax=8
Xsc1=1
Ymin=-10
Ymax=50
Ysc1=10
Xres=1
    
```

Press **GRAPH** :



例 5: 用 TI-83 Plus 来找寻截取或  $y = x^3 - 2x^2 + 2$  的“零”点, 按

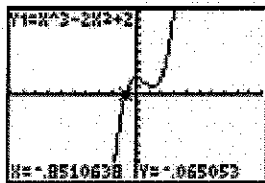
**ENTER**

a. 按 **Y=** 并键入函数 Y1.

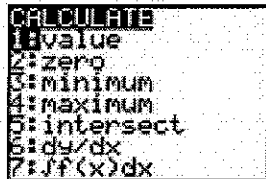


b. 按 **ZOOM** 选择 **6:Zstandard**.

c. 用 **TRACE** 和 **◀▶** 发现截取值在 **-0.85**



d. 按 **2nd** **[CALC]** 来显示计算目录



e. 选择 **2:zero**

计算器会显示 **Left Bound** 左界?

移动光标到截取段的左边并按 **ENTER**

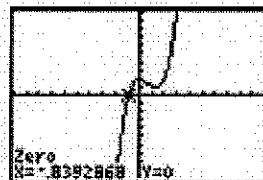
计算器会问 **Right Bound** 右界?

移动光标到截取段的右边并按 **ENTER**

计算器提示 **Guess** 猜?

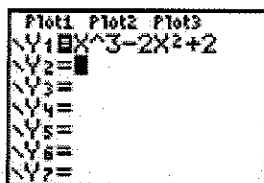
移动光标靠近截取点

You should now see:

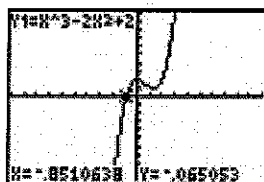


**EXAMPLE 5:** Use the TI-83 Plus to find the exact intercept or “zero” of  $y = x^3 - 2x^2 + 2$  and press **ENTER**

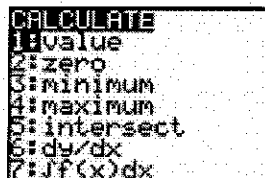
- a. Press **Y=** and type the function in Y1.



- b. Press **ZOOM** select **6:Zstandard**.  
c. Use **TRACE** and **▶◀** to see that the intercept is around **-.85**



- d. Press **2nd** **[CALC]** to see the calculate menu



- e. Select **2:zero**

The calculator says **Left Bound?**

Move the cursor to the **left** of the intercept and press **ENTER**

The calculator says **Right Bound?**

Move the cursor to the **right** of the intercept and press **ENTER**

The calculator says **Guess?**

Move the cursor **close** to the intercept

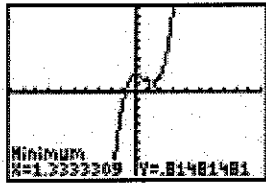
You should now see:



例 6: 利用计算目录来找寻

$$y = x^3 - 2x^2 + 2 \text{ 的最小值在 } x = 0 \text{ 和 } x = 3 \text{ 间.}$$

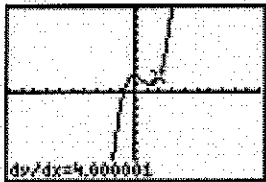
- 按  $\boxed{2\text{nd}}$   $\boxed{[CALC]}$  来显示计算目录.
- 选 **3**: 最小值并在  $x=0$  和  $x=3$  间找寻函数最小值.
- 仿照例 5 的步骤, 你会得到最小值  $y = .81481481$  或  $22/7$  当  $x = 1.3333309$



例 7: 利用计算目录来找寻

$$y = x^3 - 2x^2 + 2 \text{ 的导数当 } x = 2$$

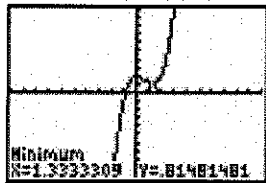
- 按  $\boxed{2\text{nd}}$   $\boxed{[CALC]}$ 来显示计算目录.
- 选 **6:dy/dx**
- 输入数值 **2** 并按  $\boxed{[ENTER]}$ . 你会看到:



(The exact derivative is  $dy/dx = 4$ )

**EXAMPLE 6:** Use the calculate menu to find minimum value of  
 $y = x^3 - 2x^2 + 2$  between  $x = 0$  and  $x = 3$ .

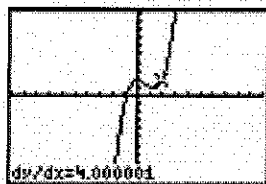
- Press  $\boxed{2nd}$   $\boxed{[CALC]}$  to see the calculate menu.
- Select **3**: minimum and find the minimum value of the function between  $x=0$  and  $x=3$ .
- Follow the same steps as in Example 5, and you should see that the minimum value is  $y = .81481481$  or  $22/7$  when  $x = 1.3333309$



**EXAMPLE 7:** Use the calculate menu to find the numerical derivative of

$$y = x^3 - 2x^2 + 2 \text{ when } x = 2$$

- Press  $\boxed{2nd}$   $\boxed{[CALC]}$  to see the calculate menu.
- Select **6**:  $dy/dx$
- Type the number **2** and press  $\boxed{ENTER}$ . You will see:



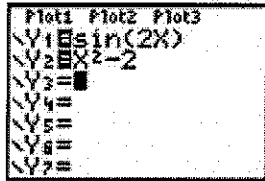
(The exact derivative is  $dy/dx = 4$ )

例 8: 利用图来解方程:

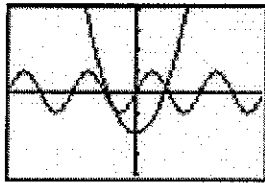
$$\sin(2x) = x^2 - 2$$

a. 按  $\boxed{Y=}$

b. 输入  $y = \sin(2x)$  到 Y1 和  $y = x^2 - 2$  到 Y2



c. 按  $\boxed{ZOOM}$  7:Ztrig

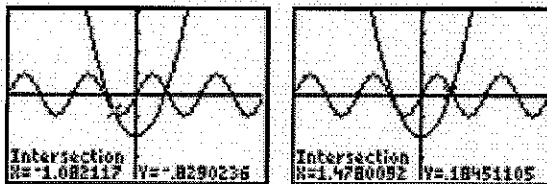


d. 按  $\boxed{2nd}$   $\boxed{[CALC]}$  5:intersect

e. 按  $\boxed{ENTER}$   $\boxed{ENTER}$ , 然后移动光标到第一个交点上然后再一次按  $\boxed{ENTER}$ .

f. 重复步骤 e. 来找到第二个交点.

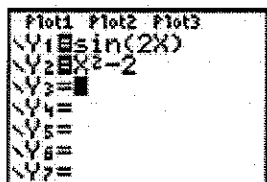
g. 这两个答案应该是  $x = -1.08$  和  $x = 1.48$ .



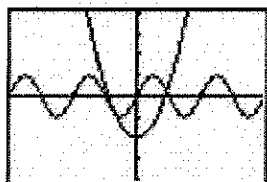
**EXAMPLE 8:** Solve the equation graphically:

$$\sin(2x) = x^2 - 2$$

- Press  $\boxed{Y=}$
- Enter  $y = \sin(2x)$  in Y1 and  $y = x^2 - 2$  in Y2



- Press  $\boxed{ZOOM}$   $\boxed{7}$ :Ztrig



- Press  $\boxed{2nd}$   $\boxed{[CALC]}$   $\boxed{5}$ :intersect
- Press  $\boxed{ENTER}$   $\boxed{ENTER}$ , then move the cursor near the first point of intersection, and press  $\boxed{ENTER}$  again.
- Repeat the process in part e. to find the second point of intersection.
- The two solutions should be  $x = -1.08$  and  $x = 1.48$ .

