Name _____

Class _____

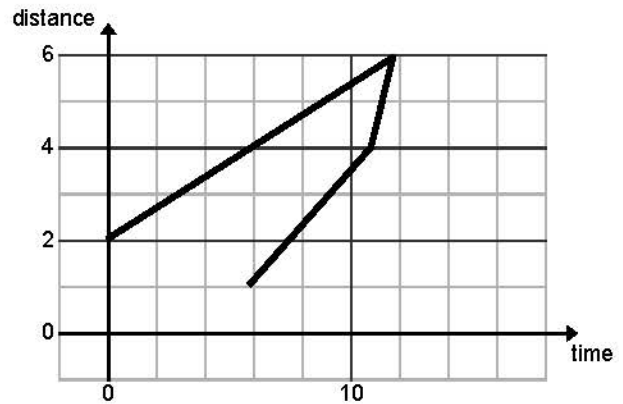## Definition

A *function* is a relation in which each input is paired with exactly <u>one</u> output.

For every value that goes into a function, the function outputs one unique result.
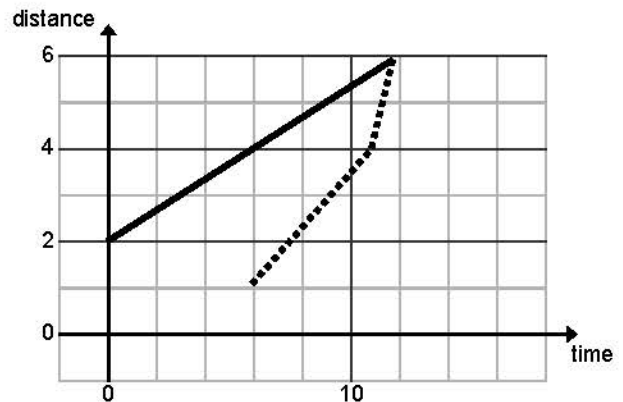
Problem 1 – Graphical

At time $t = 0$, Marty is at position $d = 2$.

1. Can the graph to the right describe Marty's position as a function of time? Explain.

2. What would have to happen for this graph to occur?

3. Redraw the dashed lines to make the graph a function.

Problem 2 – Set of ordered pairs

The first element of each ordered pair is the input value.

4. Which sets below describe a function? Explain why.

   A. {(0, 1), (1, 4), (2, 7), (3, 6)}   B. {(−2,2), (−1, 1), (0, 0), (1, 3), (2, 4)}

   C. {(3, 2), (3, 4), (5, 6), (7, 8)}   D. {(2, 3), (3, 2), (1, 4), (4, 1)}

Marty flies to Mars, where the acceleration of gravity is 0.375 of what it is on Earth. So with $a = 12$ft/s², use the distance formula $d = \dfrac{1}{2}at^2$ to compute the output when given the input.

5. Use the formula to compute d. Give the set or ordered pairs (t, d) when the input t is the set $\{0, 1, 2, 6\}$.

6. Use the formula to compute t. Give the set of ordered pairs (d, t) if the input is d. The input set for d is $\left\{0, \dfrac{2}{3}, 6\right\}$.

7. Which of the two solutions sets from Questions 5 and 6 is a function? Why?

8. From solutions sets above, which is true?

    A. d is a function of t B. t is a function of d

    C. both   D. neither

Problem 3 – Function notation
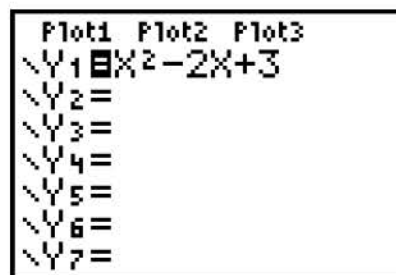
If f is a function of x this can be written as $f(x)$.

For example, $f(x) = x^2$. So $f(3) = 9$.

To use the function ability of your graphing calculator, press $\boxed{Y=}$ and enter $x^2 - 2x + 3$.
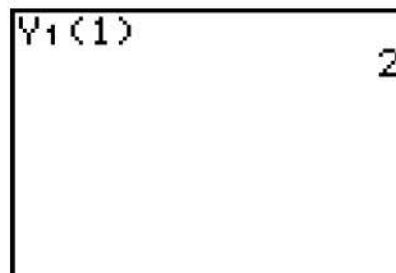
Return to the Home screen.

To enter different values for x and observe what $f(x)$ equals, press $\boxed{VARS}$, arrow right to the **Y-VARS** menu, select **Function** and then choose **Y1**. Then enter **(#)**, replacing # with the x-value.

Press $\boxed{2nd}$ $\boxed{ENTRY}$ to recall the last entry.

```
Plot1  Plot2  Plot3
\Y1◻X²-2X+3
\Y2=
\Y3=
\Y4=
\Y5=
\Y6=
\Y7=
```

```
Y1(1)
              2
```

9. For $f(x) = x^2 - 2x + 3$, find $f(4)$ using the graphing calculator, then by substitution showing your work below.

10. For $f(x) = 3x^2 + 5x + 3$, find $f(2)$ using the graphing calculator, then by substitution showing your work below.

Problem 4 – Function Machine

Run the program **MACHINE** and select option **1**. The program will return an output for the input entered.

```
OUTPUT GOAL: 8.5
INPUT?
```

11. What is the input for the function $f(x)$ that gives an output of 8.5?

12. What is the unknown function?

Now select option **2**.

```
OUTPUT GOAL: 6
INPUT?
```

13. What is the input for the function $f(x)$ that gives an output of 6?

14. What is the unknown function?

Now select option **3**.

```
OUTPUT GOAL: 83
INPUT?
```

15. What is the input for the function $f(x)$ that gives an output of 83?

16. What is the unknown function?