

Show all work for partial credit. Use of your calculator is allowed on every question. Good luck.

1. Classify each number as one or more of the following: N = Natural number, J = Integer, R = Rational number, or I = Irrational number.

each

a.)  $\frac{1}{7}$  (R)

b.)  $\sqrt{7}$  (I)

c.)  $-5$  (J, R)

2. The number of reported hacking incidents for US business computer systems has risen dramatically. The following table lists reported hacking incidents.

Year	1998	1999	2000	2001	2002
Rate	3734	9859	21756	52658	82094

a.) Has the number of hacking incidents increased by a fixed number each year?

(3) No

b.) What was the average number of hacking incidents over this 5-year period?

(3) 
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{82094 - 3734}{2002 - 1998} = \frac{78360}{4} = 19590$$

$$\frac{3734 + 9859 + 21756 + 52658 + 82094}{5} = 34020$$
 Increase per year = 34020

c.) If this trend continues, predict what the number of hacking incidents would be in 2003.

(3) 
$$82094 + 19590 = 101,684$$

This is not a rate of change.  
 $34020 + 82094 = 116114$

3. In 2005, the federal debt held by the public was 4.72 trillion dollars, and the population of the US was 296 million. Find the national debt per person rounded to the nearest dollar.

(6) 2005 \$4.72 trillion 296 million people

$$\frac{\text{debt}}{\text{person}} = \frac{4.72 \text{ trillion}}{296 \text{ million}} = \frac{4.72 \times 10^{12}}{296 \times 10^6} = 0.01594595 \times 10^6$$

$$= 15,945.95$$

$$= \$15,946$$

4. Given  $f(x) = -3x + 4$ .

a.) Complete the table for each x-value.

$$m = -3$$

x	-5	0	5	10	15
y	19	4	-11	-26	-41

b.) Does the table represent the graph of a linear function? Why or why not?

⑥ Yes, since it is in the form  $y = mx + b$  it is an equation of a line and because the slope is constant  $m = -3$ .

③ c.) Find  $f(5) = -11$

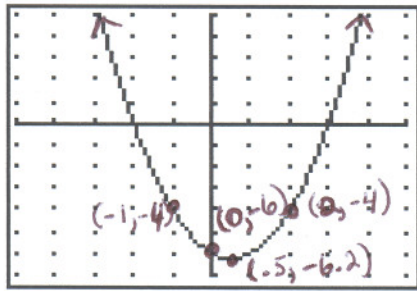
③ d.) Identify the y-intercept.  $(0, 4)$

③ e.) Determine the slope.  $m = -3$

f.) Is the graph increasing or decreasing? Why?

⑥ Decreasing since the slope is negative.

5. Each tick mark represents one unit.



6 a.) Find  $f(0) = -6$   
 $f(2) = -4$

4 b.) For what value(s) of  $x$  is  $f(x) = -4$ .  $x = -1, 2$

c.) Give the domain of the function.  $(-\infty, \infty)$

3

d.) Give the range of the function.  $[-6.2, \infty)$

$y \geq -6.2$

3

6. Find the equation of the line that passes through the points (-1, 2) and (4,3).

6 
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{4 - (-1)} = \frac{1}{5}$$

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{1}{5}(x - 4)$

$y - 3 = \frac{1}{5}x - \frac{4}{5}$   
 $+3 \qquad +\frac{15}{5} = \frac{15}{5}$

$y = \frac{1}{5}x + \frac{11}{5}$

7. Use your calculator to graph the equation  $y = 0.0001x + 4$  in the standard window. Is the line a horizontal line? Explain why or why not.

⑥ No, it looks like a horizontal line, but it is a slanted line because  $m = 0.0001$ . To be a horizontal line  $m = 0$  and the equation would be  $y = \#$ .

8. Sketch a graph that is NOT a function and state why it is not a function. (Many answers are possible.)



Does not pass the vertical line test or for every input there is not one output.

9. If a sample of a gas is heated, it will expand. The function  $V(t) = 0.183t + 50$  gives the volume  $V$  of a sample of helium in cubic inches at a temperature of  $t$  degrees Celsius.

a.) Determine the slope.  $y = mx + b$   
 $m = 0.183$   
 b.) Interpret the meaning of slope in the context of this problem.

③  $0.183$  volume in cubic inches  
 $1^\circ\text{C}$   
 The ~~temperature~~ volume increases  $0.183$  cubic inches for every  $1^\circ\text{C}$  increase in temperature.

10. In 1980, the minimum wage was about \$3.10 per hour, and in 2005 it increased to \$5.15.

Consider that the minimum wage  $W$  is a linear function of time  $t$  where  $t$  is the number of years since 1980. Find  $W(t)$ .

⑥

$t$	$W$
$t = 0$ : 1980	\$3.10
$t = 25$ : 2005	\$5.15

$$m = \frac{5.15 - 3.10}{25 - 0} = \frac{2.05}{25} = 0.082$$

$y_{\text{int}}: b = 3.10$

$$y = mx + b$$

$$y = 0.082x + 3.10$$

$$W(t) = 0.082t + 3.10$$