

## Part 1: Simplify each of the following

1. $(2y - 1)(3y + 4)$ $6y^2 + 8y - 3y - 4$ $6y^2 + 5y - 4$	2. $2x(4x - 1) - (x - 3)$ $8x^2 - 2x - x + 3$ $8x^2 - 3x + 3$	3. $m(m - 2) + 3m(m - 4)$ $m^2 - 2m + 3m^2 - 12m$ $4m^2 - 14m$
4. $(8h - 1) - (8h + 1)$ $8h - 1 - 8h - 1$ $-2$	5. $3(d - 2)(3d + 2)$ $(3d - 6)(3d + 2)$ $9d^2 + 6d - 18d - 12$ $9d^2 - 12d - 12$	6. $(7k + 2) - (6k - 2)$ $7k + 2 - 6k + 2$ $k + 4$
7. $(3r - 1)(3r + 1)$ $9r^2 + 3r - 3r - 1$ $9r^2 - 1$	8. $(w - 5)(w + 5)$ $w^2 + 5w - 5w - 25$ $w^2 - 25$	9. $(9t - 11) - (8t - 11)$ $9t - 11 - 8t + 11$ $t$

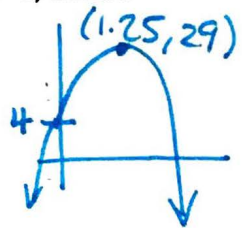
## Part 2: Find the following for the provided functions. Round to the nearest hundredth if necessary.

10. $f(x) = -5x^2 - 2x + 8$	11. $f(x) = (x - 1)(3x + 2)$
Vertex: $(-0.2, 8.2)$	Vertex: $(.17, -2.08)$
Minimum or Maximum	Minimum or Maximum
Find $f(-2)$ . $-8$	Find $f(5)$ . $68$
Find $x$ if $f(x) = 5$ . $x = -1$ and $x = 5$	Find $x$ if $f(x) = 2$ . $x = -1$ and $x = 1.33$

## Part 3: Application

12. Jason kicked a football on a projectory path that followed the model  $h(t) = -16t^2 + 40t + 4$ , where  $h(t)$  is the height of the ball in feet off of the ground and  $t$  is the time in seconds.

- What is the maximum height of the football? 29 ft
- When does the football reach its maximum height? 1.25 sec.
- From what height did the football start its parabolic path? 4 ft
- What was the height of the football 2.5 seconds after it was kicked? 4 ft
- At what time did the football reach a height of 20 feet on its way down? 2 sec.
- When did the football reach a height of 30 feet? never
- When did the football collide with the ground?  $\approx 2.60$  sec.



Part 4: Tables. Complete each of the following for the provided tables. For your explanations use phrases such as 1<sup>st</sup> difference, 2<sup>nd</sup> difference, common difference, common ratio, etc. THEN WRITE THE RECURSIVE AND EXPLICIT EQUATION FOR EACH OF THE PATTERNS.

x	y
-3	-19
-2	-17
-1	-15
0	-13
1	-11
2	-9

+2  
+2  
+2  
+2  
+2  
+2

x	y
-2	12
-1	3
0	0
1	3
2	12
3	27

-9  
-3  
+3  
+9  
+15  
+6  
+6  
+6  
+6  
+6

x	y
0	0
1	5
2	40
3	135
4	320
5	625

+5  
+35  
+95  
+185  
+305  
+30  
+60  
+90  
+120

Pattern Type: Linear

Why? 1<sup>st</sup> difference is constant

Explicit:  $y = 2x - 13$

Recursive:  $f(1) = -11$   
 $f(n) = f(n-1) + 2$

Pattern Type: Quadratic

Why? 1<sup>st</sup> difference linear +  
2<sup>nd</sup> difference constant

Explicit:  $y = 3x^2$

Recursive:  $f(1) = 3$   
 $f(n) = f(n-1) + 6n - 3$

Pattern Type: NOT Quadratic, Linear, or Exponential

Why? N/A

Explicit: N/A

Recursive: N/A

x	y
1	3
2	15
3	35
4	63
5	99
6	143
7	195

+20  
+28  
+36  
+44  
+52  
+8  
+8  
+8  
+8  
+8

x	y
-3	-16
-2	-10
-1	-4
0	2
1	8
2	14

+6  
+6  
+6  
+6  
+6  
+6

x	y
-5	-24
-4	-15
-3	-8
-2	-3
-1	0
0	1

+9  
+7  
+5  
+3  
+1  
-2  
-2  
-2  
-2  
-1  
-1

Pattern Type: Quadratic

Why? 1<sup>st</sup> difference is linear +  
2<sup>nd</sup> difference is constant

Explicit:  $y = 4x^2 - 1$

Recursive:  $f(1) = 3$   
 $f(n) = f(n-1) + 8n - 4$

Pattern Type: Linear

Why? 1<sup>st</sup> difference is constant

Explicit:  $y = 6x + 2$

Recursive:  $f(1) = 8$   
 $f(n) = f(n-1) + 6$

Pattern Type: Quadratic

Why? 1<sup>st</sup> difference is linear +  
2<sup>nd</sup> difference is constant

Explicit:  $y = -x^2 + 1$

Recursive:  $f(1) = 0$   
 $f(n) = f(n-1) - 2n + 1$