3.1 Exploring Polynomial Functions

Math Learning Target:
"I can identify a polynomial function.
I can classify polynomial functions."

With a partner, complete: "***EXPLORE** the Math*" pp. 124-126, but only
A, B, C, D, E, F**see below, K, L.

All written work is to be written on a new piece of paper in your notebook.

desmos will be used for questions that require a "graphing calculator".

** *Recall:* finite differences are first differences, second differences, and so on...
The final answers are included on the next page of this document to save you work,
BUT YOU MUST UNDERSTAND HOW THEY WERE FOUND!!

Now read p. 126 "**In Summary** ".

Finally, complete pp. 127-128 # 1, 2, 3d, 5, 7, 8

A **polynomial expression** (or **polynomial**) is a series of terms (added/subtracted) where each term is the product of a constant and a power of x with exponents that are non-negative integers.

A **polynomial function** is of the form:
$f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + ... + a_2 x^2 + a_1 x + a_0$, where a_0, a_1, a_2 etc...
are real number constants, and n is a non-negative integer.
Its finite differences eventually become constant.

The **degree** of a polynomial function will always be the value n as long as leading coefficient $a_n \neq 0$.

Study this answer for "F":

F.

f(x) = x	Δ₁
f(−3) = −3	
	1
f(−2) = −2	
	1
f(−1) = −1	
	1
f(0) = 0	
	1
f(1) = 1	
	1
f(2) = 2	
	1
f(3) = 3	

f(x) = x²	Δ₁	Δ₂
f(−3) = 9		
	−5	
f(−2) = 4		2
	−3	
f(−1) = 1		2
	−1	
f(0) = 0		2
	1	
f(1) = 1		2
	3	
f(2) = 4		2
	5	
f(3) = 9		

f(x) = x³	Δ₁	Δ₂	Δ₃
f(−3) = −27			
	19		
f(−2) = −8		−12	
	7		6
f(−1) = −1		−6	
	1		6
f(0) = 0		0	
	1		6
f(1) = 1		6	
	7		6
f(2) = 8		12	
	19		
f(3) = 27			

f(x) = x⁴	Δ₁	Δ₂	Δ₃	Δ₄
f(−3) = 81				
	−65			
f(−2) = 16		50		
	−15		−36	
f(−1) = 1		14		24
	−1		−12	
f(0) = 0		2		24
	1		12	
f(1) = 1		14		24
	15		36	
f(2) = 16		50		
	65			
f(3) = 81				

f(x) = x⁵	Δ₁	Δ₂	Δ₃	Δ₄	Δ₅
f(−3) = −243					
	211				
f(−2) = −32		−180			
	31		150		
f(−1) = −1		−30		−120	
	1		30		120
f(0) = 0		2		0	120
	1		30		
f(1) = 1		30		120	
	31		150		
f(2) = 32		180			
	211				
f(3) = 243					