Always, Sometimes, or Never True?

Directions: Read the statement, then circle the appropriate classification of the statement. Include an example that supports your classification, and a non-example if it applies.

Statement	Classification	Example/Counterexample
Cubic means the highest power of x is 3.	Always True Sometimes True Never True	Reason: The degree of the polynomial is always determined by the highest power of x.
A quadratic will have two x-intercepts because it makes a U shape.	Always True Sometimes True Never True	Depending on the equation, it may never intersect the x-axis. There will always be two zeroes for the equation, but they may not always be real or unique. Example: $x^2 - 4x - 12$ Counter Examples: One x-intercept x^2 No x-intercepts $3x^2 + 1$
An odd degree will always have an x-intercept.	Always True Sometimes True Never True	Since the end behavior is in different directions, the x-axis will be intersected eventually.
The function $y=2x^2-3x+6$ has two zeros.	Always True Sometimes True Never True	Neither of the zeros are real, but there are two zeros.
Polynomials make curved lines when graphed.	Always True Sometimes True Never True	Linear and constant equations are types of polynomials; polynomials and their graphs are lines. Example of a curved graph: x^4-2x^3+x-1 Example of linear: Any $y=mx+b$, where m, b are real numbers.

		Example of a constant function: y = a, where a is any real number.
The leading coefficient determines how steep the curve is.	Always True Sometimes True Never True	Yes, the leading coefficient does influence steepness, but so do the other coefficients. The exception would be the coefficient associated with x^0 power, which does not dilate the graph.
A polynomial must have at least three terms.	Always True Sometimes True Never True	Another way to describe a polynomial is by the number of terms of which it is composed. 1 term = monomial, 2 terms = binomial, 3 terms = trinomial.
The number of intercepts depends on the highest degree.	Always True Sometimes True Never True	The degree of the polynomial will tell you the maximum number of zeros a polynomial can potentially have. Since some zeros are not real, they may not intercept the x-axis. Similarly, zeros with an even multiplicity will touch the x-axis, but will not pass through it. For example, a quadratic can have a maximum number of 2 intercepts. This would be the case for something like $y=x^2 - 4$. However, if the multiplicity of the

		zero is even in the case of $y=x^2-4x+4$, then there will be only one zero. Finally, in $y=x^2+5$, there are no real solutions to the polynomial and it therefore has no real solutions, meaning its roots fall in the complex set of numbers.
The function $y=x^5+3x^3+7$ has one real solution.	Always True Sometimes True Never True	The solution is x= -1.35
Polynomials with an even degree have the same end behavior.	Always True Sometimes True Never True	
4th degree polynomial functions look similar to quadratic functions.	Always True Sometimes True Never True	Yes, $y=x^4$ looks like a fat parabola, but not all of them have that appearance.
Cubic graphs will continuously increase, therefore don't have a minimum or maximum.	Always True Sometimes True Never True	If the cubic function is a monomial, in the case of $y=x^3$, then there will be a point of constant slope at x=0, which means the function is neither increasing nor decreasing at that point. An example of a cubic polynomial with both increases and decreases would be $y=x^3-x+1$. There are two intervals where the function is increasing and one where it is decreasing.

		An example of a cubic polynomial that always increases would be something like y=x^3+x. This will only occur when the cubic function's derivative (a quadratic) has no real solutions.
Polynomials with an odd degree will have opposite end behavior.	Always True Sometimes True Never True	
The number of turning points depends on the highest degree of the function.	Always True Sometimes True Never True	The number of turns can be anywhere from 0 to n-1, for an nth degree function.
The constant effects the steepness of the curve.	Always True Sometimes True Never True	The constant determines where the graph is in relation to the x-axis.