Circle the functions which are *quartics*.

$$x^4 + 5x^3 - 13x^2 + 7x = 0$$

$(x+2)(x-2)(x+5)=0$

$(x^2-4)(x^2+1)=0$

$(2x - 3)(4x^2 + 6x + 9)=0$

$x^3 - 5x^2 - 8x + 12 = 0$

You have determined that a cubic function has 3 zeros. The zeros may be real, imaginary, or have multiplicity depending on the key characteristics of the functions that built it. Similarly, the Fundamental Theorem of Algebra guarantees that a quartic function has 4 zeros.

1. **List different combinations of function types that multiply to build a quartic function.**

2. Analyze the table shown. The function $h(x)$ is the product of $f(x)$ and $g(x)$.

x	$f(x)$	$g(x)$	$h(x) = f(x) \cdot g(x)$
−2	8	4	32
−1	5	1	5
0	4	0	0
1	5	1	5
2	8	4	32
3	13	9	117

a. Determine whether $h(x)$ is a quartic function. Explain your reasoning.

Think about:

What would the graph of $f(x)$ and the graph of $g(x)$ look like?

b. Determine the number of real and imaginary zeros of $h(x)$. Explain your reasoning.

c. Describe the end behavior of $h(x)$. How does this help you determine whether the function is quartic or not?

3. Analyze the table shown. The function $m(x)$ is the product of $j(x)$ and $k(x)$.

x	$j(x)$	$k(x)$	$m(x) = j(x) \cdot k(x)$
−2	4	−1	−4
−1	0	0	0
0	−2	1	−2
1	−2	2	−4
2	0	3	0
3	4	4	16

a. Determine whether $m(x)$ is a quartic function. Explain your reasoning.

b. Determine the number of real and imaginary zeros of $m(x)$. Explain your reasoning.

c. Describe the end behavior of $m(x)$. How does this help you determine whether the function is quartic or not?

4. Analyze the table shown. The function $v(x)$ is the product of $t(x)$ and $w(x)$.

x	$t(x)$	$w(x)$	$v(x) = t(x) \cdot w(x)$
−2	4	−11	−44
−1	3	−6	−18
0	4	−3	−12
1	7	−2	−14
2	12	−3	−36
3	19	−6	−114

a. Determine whether $v(x)$ is a quartic function. Explain your reasoning.

b. Determine the number of real and imaginary zeros of $v(x)$. Explain your reasoning.

c. Describe the end behavior of $v(x)$. How does this help you determine whether the function is quartic or not?