Find the sum and difference for each set of functions and give the degree in each case. Make sure your answer is in standard form.

a. $f(x) = 3x^3 + 5x - 7$ *and* $g(x) = 4x^3 - 2x^2 + 4x + 3$

$f(x)+g(x) = 7x^3 - 2x^2 + 9x - 4$

$f - g = -x^3 + 2x^2 + x - 10$

b. $f(x) = 3x^3 + 4x^2 + 5$ *and* $g(x) = -3x^3 - 2x^2 + 5x$

$f + g = 2x^2 + 5x + 5$

$f - g = 6x^3 + 6x^2 - 5x + 5$

c. $f(x) = x^4 + 5x^3 - 7x + 5$ *and* $g(x) = 4x^3 - 2x^2 + 5x + 3$

d. $f(x) = 6x^4 + 5x^3 - 7x + 5$ *and* $g(x) = 6x^4 + 5x$

Zeros	Graph each function and find the zeros.

X-intercepts

Where y/f(x) = 0

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

$0 = x^3 - 6x^2 + 9x$

$x = 0$

$x = 3$

$g(x) = x^4 - 10x^3 + 32x^2 - 38x + 25$

None

$h(x) = 4x^3 - 9x^2 - 10x + 3$

$x = -1, 3, \frac{1}{4}$

$p(x) = x^3 - 5x^2 - 8x + 12$

$x = -2, 1, 6$

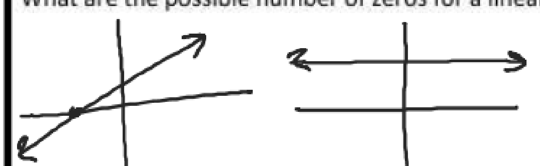
$f(x) = x^4 - 12x^3 + 19x^2 + 12x - 20$

$x = -1, 1, 2, 10$

$t(x) = x^4 - 7x^3 + 17x^2 - 17x + 6$

$x = 1, 2, 3$

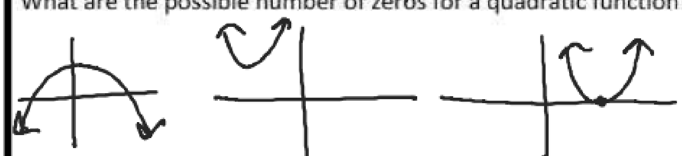
What are the possible number of zeros for a linear function?



0, 1

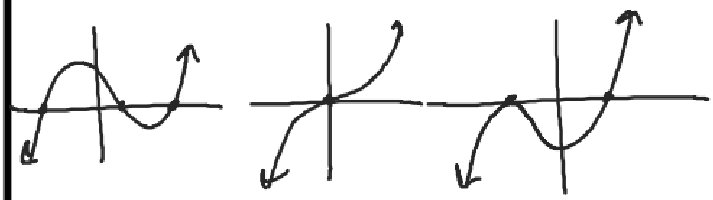
What are the possible number of zeros for a quadratic function?

0, 1, 2

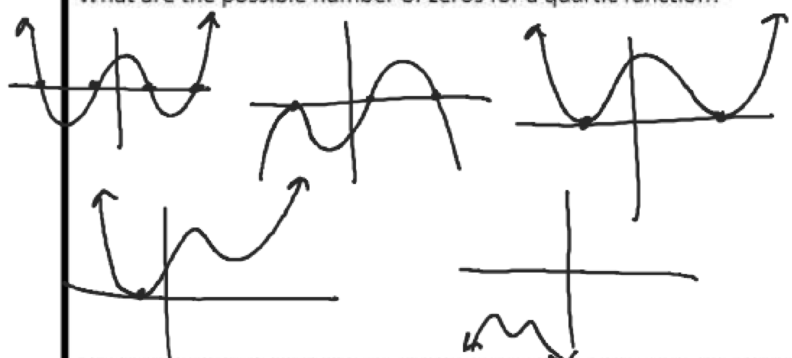


Zeros and Products of Polynomials

What are the possible number of zeros for a cubic function? 1, 2, 3



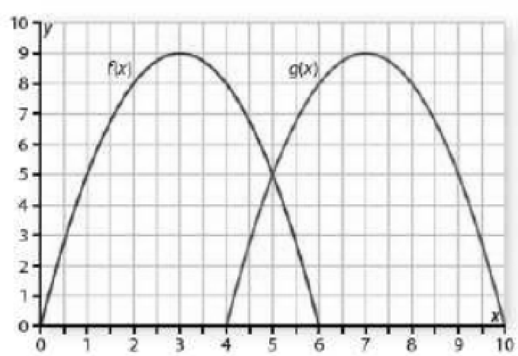
What are the possible number of zeros for a quartic function? 0, 1, 2, 3, 4



How does the degree of a polynomial seem to be related to the number of zeros of the related polynomial function?

Degree is maximum number of zeros for polynomial

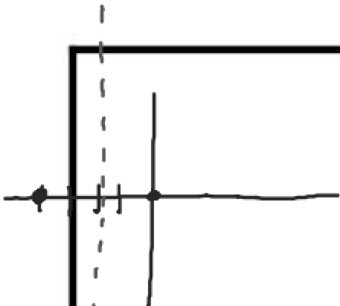
The two parabolas that make up the "m" in the following diagram can be created by graphing $f(x) = -x^2 + 6x$ and $g(x) = -x^2 + 14x - 40$.

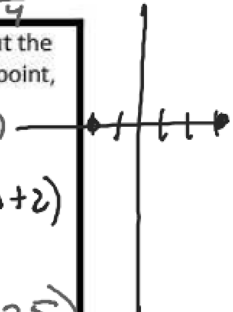


	Write each equation in equivalent factored form. $f(x) = -x^2 + 6x$ $-x(x-6)$ $g(x) = -x^2 + 14x - 40$ $-(x^2 - 14x + 40)$ $-(x-4)(x-10)$ For each function write the rule in both standard form and factored from. $h(x) = x^2 + 4x$ $x(x+4)$ $j(n) = -n^2 + n + 6$ $-(n^2 - n - 6)$ $-(n-3)(n+2)$ $k(x) = (2x-1)(x+5)$ $2x^2 + 9x - 5$
$a \cdot b = 0$	Using the functions above, show how to use the factored form to find zeros of the function and x-intercepts of its graph. $h(x) = x(x+4)$ $0 = x(x+4)$ $x = 0 \quad x+4=0$ $x = -4$ $j(n) = -(n-3)(n+2)$ $0 = -(n-3)(n+2)$ $0 = (n-3)(n+2)$ $n-3=0 \quad n+2=0$ $n=3 \quad n=-2$ $k(x) = (2x-1)(x+5)$ $2x-1=0 \quad x+5=0$ $x=\frac{1}{2} \quad x=-5$

$2.5 = \frac{5}{2}$ $\qquad \frac{3+(-2)}{2} = \frac{1}{2}$

$-(-\frac{5}{2})(\frac{5}{2}) = \frac{25}{4}$





Using the same function, use the factored form and information about the x-intercepts to find the line of symmetry, the maximum or minimum point, and the y-intercept of the graph.

$(-2)(-2+4)$ $\qquad -(-2.5)(2.5)$

$h(x) = x(x+4)$

$0(0+4)$

A.O.S $x=-2$

min → Vertex $(-2,-4)$

Y-intercept $(0,0)$

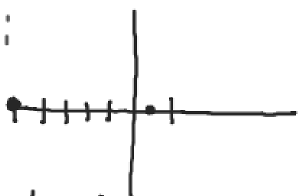
$j(n)$ $-(n-3)(n+2)$

$-(-3)(2)$

A.O.S $x = \frac{1}{2}$

max Vertex $(\frac{1}{2}, \frac{25}{4})$

Y-intercept $(0,6)$



$k(x) = (2x-1)(x+5)$

A.O.S $x = -\frac{9}{4}$

min Vertex $(-\frac{9}{4}, -\frac{121}{8})$

Y-intercept $(0,-5)$

$\frac{\frac{1}{2}+(-5)}{2} = -\frac{9}{4}$

$x = -\frac{b}{2a}$

Use the standard form of the polynomial to locate the line of symmetry, maximum or minimum point, and y-intercept of the graph.

$h(x) = x^2+4x$ $\quad V(-2,-4)$

$-\frac{4}{2(1)} = -2$ $\quad$ A.O.S $x=-2$

$(-2)^2+4(-2)$ $\quad$ Y-intercept $(0,0)$

$4-8$

$j(n) = -n^2+n+6$

$x = \frac{-1}{2(-1)} = \frac{1}{2}$

$-(\frac{1}{2})^2+(\frac{1}{2})+6$

$-\frac{1}{4}+\frac{1}{2}+6$

$\frac{1}{4}+6 = 6.25 = \frac{25}{4}$

$V(\frac{1}{2}, \frac{25}{4})$

A.O.S $x = \frac{1}{2}$

Y-inter $(0,6)$

$k(x) = 2x^2+9x-5$

$a \cdot b \cdot c = 0$

Consider the function $q(x) = x(x-3)(x+5)$.

$x=0$ $\quad x-3=0$ $\quad x+5=0$

a. What are the zeros of $q(x)$?

$x = 0, 3, -5$

b. Write the rule for $q(x)$ in standard form.

$x(x^2+2x-15)$

$q(x) = x^3+2x^2-15x$

c. Identify the degree of $q(x)$. How could you have predicted that property of the polynomial before any algebraic manipulation?

Degree = 3

3 Zeros   3 linear factors.

d. Graph $q(x)$ and label the x-intercepts, y – intercepts, and local extrema.