Characteristics of Polynomials in Factored Form

Consider a polynomial in the form:

$$g(x) = a(x-p)(x-q)(x-r)$$

factors

The factors of the polynomial can be used to identify the zeroes (or roots, or x-intercepts).

$$set\ g(x) = 0$$

$$0 = a(x-p)(x-q)(x-r)$$

$a \neq 0$, so $x-p=0$ or $x-q=0$ or $x-r=0$

$x = p$ $x = q$ $x = r$

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The order or degree of the factors will determine the behaviour of the graph near the x-axis.

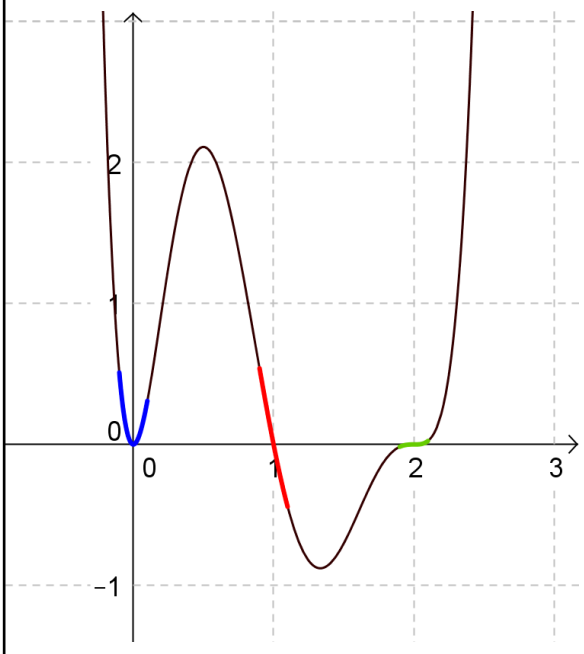
Consider $f(x) = 5x^{2}(x-1)^{1}(x-2)^{3}$

order

$x = 0$ 2

$x = 1$ 1

$x = 2$ 3



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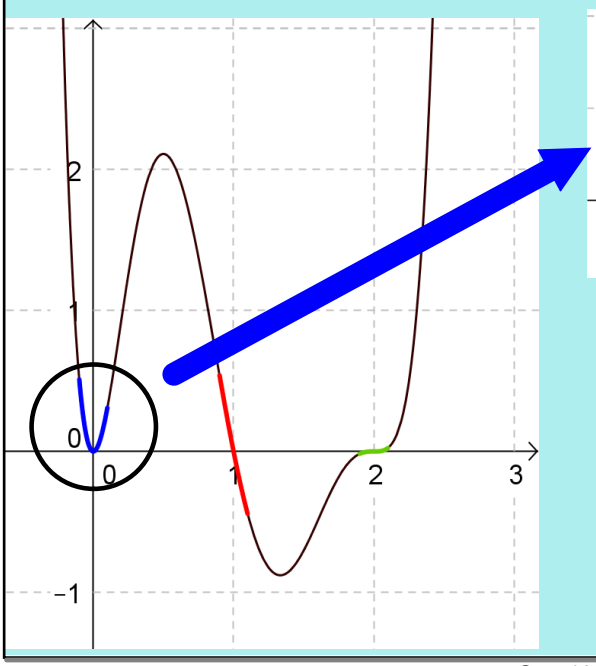
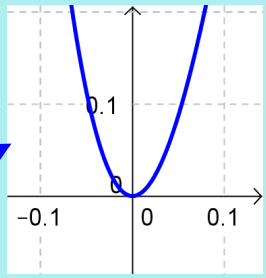
The order or degree of the factors will determine the behaviour of the graph near the x-axis.

Consider $f(x) = 5x^2(x-1)(x-2)^3$





factor: x^2

zero at: $x = 0$

behaviour: quadratic

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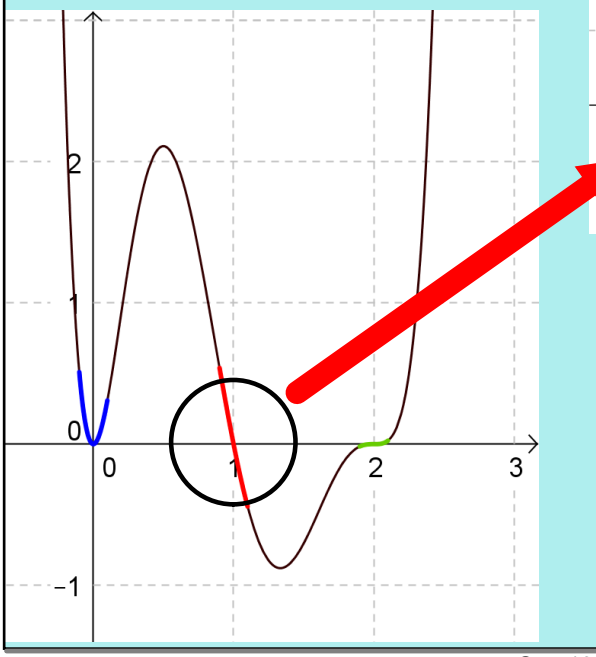
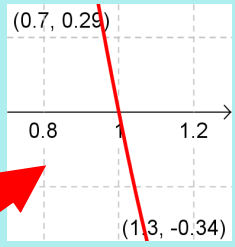
The order or degree of the factors will determine the behaviour of the graph near the x-axis.

Consider $f(x) = 5x^2(x-1)(x-2)^3$





factor: $(x-1)$

zero at: $x = 1$

behaviour: linear

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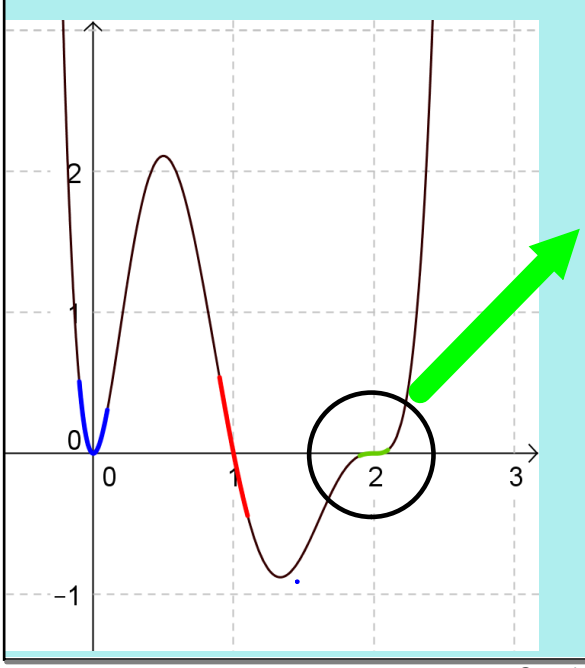
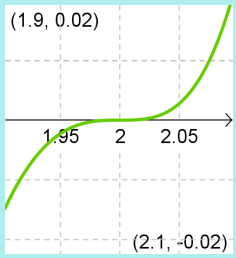
The order or degree of the factors will determine the behaviour of the graph near the x-axis.

Consider $f(x) = 5x^2(x-1)(x-2)^3$





factor: $(x-2)^3$

zero at: $x = 2$

behaviour: cubic

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To sketch the graph of a polynomial in factored form:

(1) use leading coefficient and order of polynomial to determine end behaviour,
(2) plot x-intercepts (zeroes) and y-intercepts, Set $x = 0$
(3) use order of factors to sketch behaviour at x-axis.

To determine the equation in factored form:

(1) substitute zeroes from graph into equation,
(2) determine order of each zero from behaviour of graph near x-axis
(3) substitute another point (not a zero) and solve for the value of a (leading coefficient).

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Assigned Work:

p.146 # 1, 2, 4, 6, 9ab, 10, 12, 13, 14 (find k only)

(many of these questions are quick sketches)

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