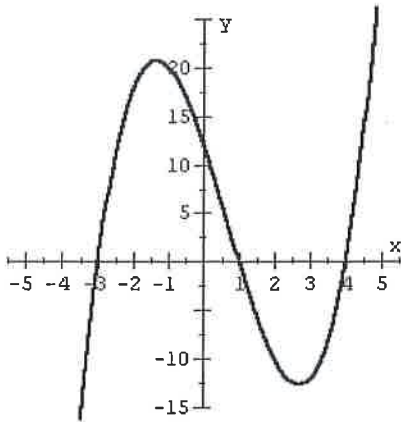


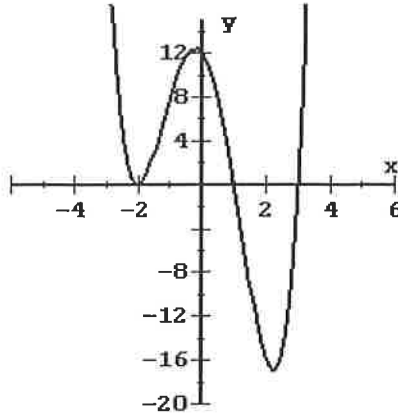
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Factoring Polynomials – Finding Zeros of Polynomials - 1

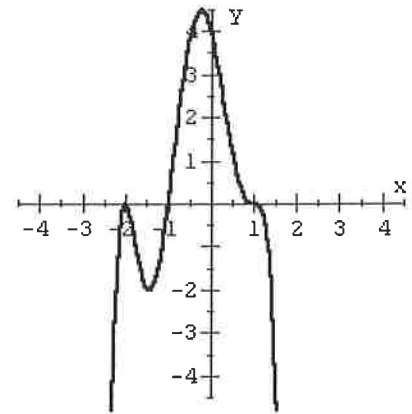
Give a possible **factorization** of the following polynomials. Do NOT multiply out the factors!



1) $f(x) = (x+3)(x-1)(x-4)$



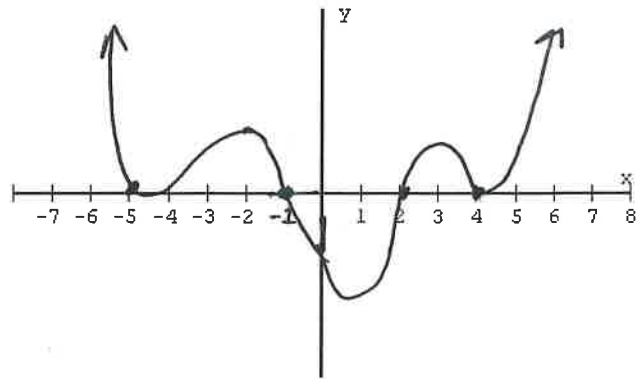
2) $f(x) = (x+2)^2(x-1)(x-3)$



3) $f(x) = 7(x+2)^2(x+1)(x-1)$

- 4) Sketch a Graph of a polynomial with the given zeros and corresponding multiplicities.
(note: the graph is not unique)

- $x = -5$, of multiplicity 2
- $x = -1$, of multiplicity 1
- $x = 2$, of multiplicity 3
- $x = 4$, of multiplicity 2



- 5) Find the zeros of the following polynomial function and state the multiplicity of each zero.

$$f(x) = x(x-1)^2(2x+1)(x+4)^3$$

$x = 0$ mult 1
 $x = 1$ mult 2
 $x = -\frac{1}{2}$ mult 1
 $x = -4$ mult 3

- 6) Find a polynomial function of degree 3 with the given zeros.
Write your answer in the form: $f(x) = ax^3 + bx^2 + cx + d$

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

$f(x) = (x+2)(x+1)(x-2)$

$f(x) = (x+2)(x^2 - x - 2)$

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

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

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- 7) Find a polynomial function (**factored form**) of degree 3 which has the corresponding table of values to the right.

$$f(x) = (x-3)(x-1)(x+2)$$

x	y
4	18
3	0
2	-4
1	0
0	6
-1	8
-2	0
-3	-24
-4	-70

Factor the following polynomial functions completely. Exact answers only!!! No Decimal approximations allowed!

- 8) **FACTOR:** $f(x) = x^5 + 2x^4 - 18x^3 - 4x^2 + 49x - 30$

see attached

- 9) **FACTOR:** $f(x) = 6x^4 - 7x^3 - 73x^2 + 14x + 24$

see attached

List the real zeros of the following polynomial. Exact answers only!!! No Decimal approx.

10) $f(x) = x^4 + 2x^3 - 10x^2 - 14x + 21$

possible roots: $\pm 1, 3, 7, 21$

$$\begin{array}{r}
 \underline{1} \mid 1 \quad 2 \quad -10 \quad -14 \quad 21 \\
 \downarrow \quad 1 \quad 3 \quad -7 \quad -21 \\
 \hline
 -3 \mid 1 \quad 3 \quad -7 \quad -21 \quad \text{☺} \\
 \downarrow \quad -3 \quad 0 \quad 21 \\
 \hline
 1 \quad 0 \quad -7 \quad \text{☺}
 \end{array}$$

$$f(x) = (x-1)(x+3)(x^2-7)$$

$$x = 1, -3, \pm\sqrt{7}$$

$$8) f(x) = x^5 + 2x^4 - 18x^3 - 4x^2 + 49x - 30$$

possible roots: $\pm 1, 2, 3, 5, 6, 10, 15, 30$

$$\begin{array}{r|rrrrrr} -5 & 1 & 2 & -18 & -4 & 49 & -30 \\ & \downarrow & -5 & 15 & 15 & -55 & 30 \\ \hline \end{array}$$

$$\begin{array}{r|rrrrrr} -2 & 1 & -3 & -3 & 11 & -6 & \text{☹} \\ & \downarrow & -2 & 10 & -14 & 6 & \\ \hline \end{array}$$

$$\begin{array}{r|rrrrr} 1 & 1 & -5 & 7 & -3 & \text{☺} \\ & \downarrow & 1 & -4 & 3 & \\ \hline 1 & -4 & 3 & \text{☺} & & \end{array}$$

$$f(x) = (x+5)(x+2)(x-1)(x^2 - 4x + 3)$$

$$f(x) = (x+5)(x+2)(x-1)(x-3)(x-1)$$

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

$$9) f(x) = 6x^4 - 7x^3 - 73x^2 + 14x + 24$$

possible roots: $\pm \frac{\text{factors of } 24}{\text{factors of } 6}$

$$\pm \frac{1, 2, 3, 4, 6, 8, 12, 24}{1, 2, 3, 6} \rightarrow \pm 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{6}, 2, \frac{2}{3}, 3, \frac{3}{2}, 4, \frac{4}{3}, 6, 8, \frac{8}{3}, 12, 24$$

$$\underline{-3} \mid \begin{array}{cccccc} 6 & -7 & -73 & 14 & 24 & \end{array}$$

$$\downarrow \begin{array}{cccccc} & -18 & 75 & -6 & -24 & \end{array}$$

$$\underline{4} \mid \begin{array}{cccccc} 6 & -25 & 2 & 8 & \text{☺} & \end{array}$$

$$\downarrow \begin{array}{cccccc} & 24 & -4 & -8 & & \end{array}$$

$$\begin{array}{cccccc} 6 & -1 & -2 & \text{☺} & & \end{array}$$

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

$$f(x) = (x+3)(x-4)(3x-2)(2x+1)$$

$$\begin{array}{l} 6x^2 - 4x + 3x - 2 \\ 2x(3x-2) + 1(3x-2) \end{array}$$