



c)  $x^4 + 3x^3 - 20x^2 + 24x - 8$

d)  $x^4 - x^3 + 2x^2 - 4x - 8$

**Solution:**

a) From the previous exercise, the zeros of  $x^3 - 4x^2 - 7x + 10$  are 1, -2 and 5.

Therefore,  $x^3 - 4x^2 - 7x + 10 = (x - 1)(x + 2)(x - 5)$

b) From the previous exercise, the zeros of  $3x^3 - 8x^2 - 8x + 8$  are  $\frac{2}{3}, 1 + \sqrt{5}, 1 - \sqrt{5}$ .

Therefore,  $3x^3 - 8x^2 - 8x + 8 = (x - \frac{2}{3})(x - (1 + \sqrt{5}))(x - (1 - \sqrt{5}))$ .

c) From the previous exercise, the zeros of  $x^4 + 3x^3 - 20x^2 + 24x - 8$  are 1, 2,  $-3 - \sqrt{13}, -3 + \sqrt{13}$ .

Therefore,  $x^4 + 3x^3 - 20x^2 + 24x - 8 = (x - 1)(x - 2)(x - (-3 - \sqrt{13}))(x - (-3 + \sqrt{13}))$

d) From the previous exercise, the zeros of  $x^4 - x^3 + 2x^2 - 4x - 8$  are -1, 2,  $2i, -2i$ .

Therefore,  $x^4 - x^3 + 2x^2 - 4x - 8 = (x + 1)(x - 2)(x + 2i)(x - 2i)$ .

5. Solve the equation  $(x - 1)^2(x - 2)(x - 3)(x + 4) = 0$ .

[NOTE: you DO NOT need to do any calculation for this one; use the *factor theorem* to find the solution by just looking at the equation.]

**Solution:** 1 (with multiplicity two), 2, 3 and -4.

6. For the following polynomials, find the end behavior, the  $y$  intercept, and the  $x$  intercepts with multiplicities. Then sketch the graph in graph paper.

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

b)  $f(x) = x^3 - x^2 - 5x - 3$