FACTORING POLYNOMIALS

Recall that the rational roots theorem says:

> If $f(x) = a_d x^d + a_{d-1}x^{d-1} + \ldots + a_1 x + a_0$ is a polynomial with **integer** coefficients then the only possible rational roots of $f(x)$ are of the form a/b where a is a factor of a_0, and b is a factor of a_d.

(1) List the possible rational roots for $f(x) = x^7 - x^6 - x^4 - x^3 - 2x^2 - 1$ and determine which are actual roots.

(2) What are the possible rational roots for $g(x) = x^6 + 3x^4 - 12x^3 + 9x + 3$? Which are actual roots of $g(x)$? (Hint: Use a calculator to check some of these)

(3) Using what you've done above, can you say anything about whether or not $g(x)$ or $f(x)$ factors? What do you think - are they prime polynomials or do they factor?