$$x^5 + x^4 + x^3 + x^2 + x + 1 = x^2(x^3 + x^2 + x + 1 + \frac{1}{x} + \frac{1}{x^2})$$
$$= x^2\{(x^3 + 1) + (x^2 + \frac{1}{x}) + (x + \frac{1}{x^2})\}$$
$$= x^2\{(x^3 + 1) + (\frac{x^3 + 1}{x}) + (\frac{x^3 + 1}{x^2})\}$$
$$= x^2(x^3 + 1) + x(x^3 + 1) + (x^3 + 1)$$
$$= (x^3 + 1)(x^2 + x + 1)$$
$$= (x + 1)(x^2 - x + 1)(x^2 + x + 1)$$