Find the quotient of each of the following using polynomial long division.

1) \[
\frac{6x^3 - 16x^2 + 17x - 6}{3x - 2}
\]

2) \[
\frac{3x^3 - 17x^2 + 15x - 25}{x - 5}
\]

3) \[
\frac{x^4 + 3x^2 + 1}{x^2 - 2x + 3}
\]

4) \[
\frac{x^4 - x^3 - 12x^2 - 2x + 8}{x - 4}
\]

5) \[
\frac{6x^3 + 10x^2 + x + 8}{2x^2 + 1}
\]

6) \[
\frac{3x^3 - 16x^2 - 72}{x - 6}
\]

7) \[
\frac{x^5 - 4x^4 + 4x^3 - 13x^2 + 3x - 1}{x^2 + 3}
\]

8) \[
\frac{2x^3 + 5x^2 + 2x + 15}{2x^2 - x + 5}
\]

9) Is \(x + 2\) a factor of \(x^3 + 8\)?

10) Is \(x - 6\) a factor of \(3x^3 - 16x^2 - 72\)?

11) Describe the manner in which you determined whether or not the given binomials above were factors of their respective polynomials.

12) When a polynomial \(p(x)\) is divided by \(x - 1\), the quotient is \(-2x^2 + 3x + 5 + \frac{12}{x - 1}\).

What is \(p(x)\)? How did you find \(p(x)\)?