

Problem 2.1 Find the partial fraction decomposition of

$$g(x) = \frac{2x + 7}{(x - 1)(x + 2)(x - 4)}$$

Problem 2.2 Let $f(x) = 2x^4 - 15x^2 - 11x + 6$. Find all of the x -intercepts of the graph of f .

Problem 2.3 Let

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

Sketch the graph of $g(x)$. Be sure to label the intercepts and asymptotes.

Problem 2.4 Factor $f(x) = x^3 + 4x^2 + 9x + 10$ over the complex numbers.

Problem 2.5 Sketch the graph of

$$f(x) = -\frac{1}{20}(x + 2)^2(x + 1)^3(x - 5)^2$$

Be sure to label all intercepts.

Problem 2.6 Find a function $Q(x)$ and a number R so that

$$2x^4 - 13x^3 + 10x^2 + 21x + 14 = (x - 5)Q(x) + R$$

Problem 2.7 Let

$$g(x) = \frac{x + 2}{x^2 - 6x + 8}$$

Sketch the graph of $g(x)$. Be sure to label the intercepts and asymptotes.

Problem 2.8 The polynomial $f(x)$ has degree 4, real coefficients, leading coefficient 3, and roots $1/4$ (with multiplicity 2) and $3 - 2i$. Find $f(x)$, factored over the real numbers.

Problem 2.9 Find all roots of the polynomial

$$f(x) = 3x^4 - 23x^3 - 34x^2 - 17x - 9$$

Problem 2.10 Find the partial fraction decomposition of

$$g(x) = \frac{x^2 + x - 20}{(x + 2)^2(x - 1)}.$$

Problem 2.11 Let $P(x) = x^7 - 9x^6 + 18x^5 - 29x^4 + 10x^3 - 11x^2 + 30x + 146$. Without using a calculator, compute $P(7)$. *Hint:* Yes, there is a trick for this one.