

1. Find the partial fraction decomposition of $\frac{x^2+8}{x^2-5x+6}$ (Hint: notice $\text{degree}(\text{top}) \geq \text{degree}(\text{bottom})$, so divide first.)

2. Find the partial fraction decomposition of $\frac{1}{x(x^2+1)^2}$ (Hint: it's probably easier to expand and match coefficients rather than plug in x -values. This often helps with irreducible quadratic factors.)

Q: What is harder to catch the faster you run?

3. Write the form of the partial fraction decomposition of $\frac{1}{x^3(2x+1)(x^2+3)^2(5-x)}$.

4. Write the form of the partial fraction decomposition of $\frac{x^3-5x^2+2x-7}{x^2(x-1)^3(2x-3)(x^2+1)}$.

5. Find the partial fraction decomposition of $\frac{9x^2+6x+3}{2x^3+3x^2-3x-2}$.

6. Find the partial fraction decomposition of $\frac{4x^2-16x}{2x^3-7x^2+9}$.

7. Find the partial fraction decomposition of $\frac{x^2-3x+5}{(x-2)^2(x+4)}$.

8. Find the partial fraction decomposition of $\frac{x^2+10x-36}{x^3-6x^2+9x}$.

9. Find the partial fraction decomposition of $\frac{x^2-x-21}{2x^3-x^2+8x-4}$.

10. Find the partial fraction decomposition of $\frac{2x^3+2x^2+4x-3}{x^4+x^2}$.

11. Find the partial fraction decomposition of $\frac{2x^3+3x-3}{(x^2+1)^2}$.

12. Find the partial fraction decomposition of $\frac{2x^4+x^3+15x^2+4x+32}{x(x^2+4)^2}$.

13. Find the partial fraction decomposition of $\frac{6x^3-7x^2-13x-15}{3x^2-5x-2}$.

14. Find the partial fraction decomposition of $\frac{4x^5+12x^3-2x^2+6x-2}{x^4+2x^2}$.

Optional exercises from the Sullivan book if you'd like more practice:
11.5 (p.768) #13-39 odd, 47-53 odd