

HW 6a

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1. a) $x \neq 1, \frac{-4}{3}$ b) $x \neq 8, -2$ c) $x \neq 3$ d) $x \neq 0$ e) $x \neq -4$
 f) $x \neq \pm \frac{\sqrt{2}}{2}$ g) $x \neq 2$ h) $x \neq 0, \pm 3, \pm 2$ i) $x \neq 27, 0$
 j) $x \neq -2, \frac{-4}{3}, \pm 3$ k) $x \neq \pm 4$ l) $x \neq 0, \pm 2, \frac{-3 \pm \sqrt{5}}{2}, 1$

2. a) $\frac{2}{x+5} + \frac{2}{x+2}$ NPV:
 $x \neq -5, -2$

$$= \frac{2(x+2) + 3(x+5)}{(x+5)(x+2)}$$

$$= \frac{2x+4+3x+15}{(x+5)(x+2)}$$

$$= \frac{5x+19}{(x+5)(x+2)}$$

b) $\frac{x-2}{x+2} + \frac{x+1}{x-4}$ NPV:
 $x \neq -2, 4$

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

$$= \frac{x^2 - 6x + 8 + x^2 + 3x + 2}{(x+2)(x-4)}$$

$$= \frac{2x^2 - 3x + 10}{(x+2)(x-4)}$$

c) $\frac{3}{x-1} - \frac{2}{2-x}$ NPV:
 $x \neq 1, 2$

$$= \frac{3(2-x) - 2(x-1)}{(x-1)(2-x)}$$

$$= \frac{6-3x-2x+2}{(x-1)(2-x)}$$

$$= \frac{8-5x}{(x-1)(2-x)}$$

d) $\frac{5x}{3x+9} - \frac{9x}{2x+6}$ NPV:
 $x \neq -3$

$$= \frac{5x}{3(x+3)} - \frac{9x}{2(x+3)}$$

$$= \frac{5x(2(x+3)) - 9x(3(x+3))}{6(x+3)^2}$$

$$= \frac{10x(x+3) - 27x(x+3)}{6(x+3)^2} = \frac{-17x}{6(x+3)}$$

e) $\frac{2}{x-2} + \frac{2x}{2-x} + \frac{x+2}{x-2}$ NPV:
 $x \neq 2,$

$$= \frac{2}{x-2} + \frac{2x}{-x+2} + \frac{x+2}{x-2}$$

$$= \frac{2(-x+2) + 2x(x-2) + (x+2)(-x+2)}{(x-2)(-x+2)}$$

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

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

f) $\frac{4x^2-20x}{x^2+2x-35} + \frac{3x-6}{x^2-12x+20}$ NPV:
 $x \neq -7, 5, 2, 10$

$$= \frac{4x(x-5)}{(x+7)(x-5)} + \frac{3(x-2)}{(x-10)(x-2)}$$

$$= \frac{4x}{x+7} + \frac{3}{x-10}$$

$$= \frac{4x(x-10) + 3(x+7)}{(x+7)(x-10)}$$

$$= \frac{4x^2-37x+21}{(x+7)(x-10)}$$

g) $\frac{a}{a+b} - \frac{b}{b-a} + \frac{2ab}{a^2-b^2}$ NPV:
 $a \neq -b$
 $a \neq b$

$$= \frac{a}{a+b} + \frac{b}{a-b} + \frac{2ab}{(a+b)(a-b)}$$

$$= \frac{a(a-b) + b(a+b) + 2ab}{(a+b)(a-b)}$$

$$= \frac{a^2-ab+ab+b^2+2ab}{(a+b)(a-b)}$$

$$= \frac{(a+b)^2}{(a+b)(a-b)} = \frac{a+b}{a-b}$$

h) $\frac{2x-6}{x^2-5x+6} - \frac{3x-12}{x^2-x-12}$ NPV:
 $x \neq 3, 4, 2, -3$

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

$$= \frac{2}{x-2} - \frac{3}{x+3}$$

$$= \frac{2x+6-3x+6}{(x-2)(x+3)}$$

$$= \frac{-x+12}{(x-2)(x+3)}$$

i) $\frac{2x}{3x^2-11x+6} - \frac{3x-12}{3x^2-14x+8}$ NPV:
 $x \neq 4, 3, \frac{2}{5}$

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

j) $\frac{2x}{3-x} - \frac{3x}{x+3} + \frac{2}{x^2-9}$ NPV:
 $x \neq 3, -3$

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

