Mathematics
Test problems

Problem 1

Solve the following equation:

$$\frac{4}{x+3} + \frac{3x}{x-4} - \frac{x-1}{x^2-x-12} = 0$$

Problem 2

Consider the expression below. Determine all values of x for which this expression is positive, 0 and negative, respectively. (*Recall that Euler's number $e \approx 2.718$*):

$$-(x-1)^2 \frac{x^2-2}{2e^x-4}$$

Problem 3

Solve the system of equations (1)-(3) for x, y and z:

$$x^2 + 4y - 4z - zx = 8 \tag{1}$$
$$y - x - 2z = 0 \tag{2}$$
$$e^{x-y} = \frac{1}{e^2} \tag{3}$$

Problem 4

Solve the following equation (*Recall that $|u|$ denotes the absolute value of u*):

$$\sum_{i=2}^{6} i^{-1}x^2 = \frac{9}{20}x^2 + \sum_{i=1}^{5} x^{|i-3|}$$

Problem 5

Solve the system of equations (4)-(6) for x, y and z:

$$z^2 - x^2 - 2xy = 1 \tag{4}$$

$$\ln\left(\frac{x+y}{z}\right) = 0 \tag{5}$$

$$x^2 - 2y^2x - 4y^2 = 4 \tag{6}$$

Problem 6

Solve the following equation:

$$2^{6\ln(x)} = x^{3\ln(x)}$$