

Math 32 Discussion Problems

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Tuesday 2nd December, 2008

Solving systems of equations

1. Solve the following systems of two equations and two unknowns. Use either the substitution method or the addition-subtraction method.

$$(a) \begin{cases} 3x - 2y = -19 \\ x + 4y = -4 \end{cases}$$

$$(e) \begin{cases} -8x + y = -2 \\ 4x - 3y = 1 \end{cases}$$

$$(b) \begin{cases} 4x + 2y = 3 \\ 10x + 4y = 1 \end{cases}$$

$$(f) \begin{cases} 16x - 3y = 100 \\ 16x + 10y = 10 \end{cases}$$

$$(c) \begin{cases} -8x + 13y = -3 \\ 2x - 7y = 0 \end{cases}$$

$$(g) \begin{cases} 2.1x - 3.5y = 1.2 \\ 1.4x + 2.6y = 1.1 \end{cases}$$

$$(d) \begin{cases} -\frac{2}{5}x + \frac{1}{4}y = 3 \\ \frac{1}{4}x - \frac{2}{5}y = -3 \end{cases}$$

$$(h) \begin{cases} \sqrt{6}x - \sqrt{3}y = 3\sqrt{2} - \sqrt{3} \\ \sqrt{2}x - \sqrt{5}y = \sqrt{6} + \sqrt{5} \end{cases}$$

2. Let $0 \neq a \neq b$. Solve the following system in terms of a and b :

$$\begin{cases} ax + by = 1/a \\ b^2x + a^2y = 1 \end{cases}$$

3. Use Gaussian elimination to solve the following systems of equations:

$$(a) \begin{cases} A + B - C = -1 \\ 3A - B + 2C = 9 \\ 5A + 3B + 3C = 1 \end{cases}$$

$$(d) \begin{cases} -2x + 2y - z = 0 \\ 3x - 4y + z = 1 \\ 5x - 8y + z = 1 \end{cases}$$

$$(b) \begin{cases} 2x + 5y - 3z = 4 \\ 4x - 3y + 2z = 9 \\ 5x + 6y - 2z = 18 \end{cases}$$

$$(e) \begin{cases} 3x + y - z = 10 \\ 8x - y - 6z = -3 \\ 5x - 2y - 5z = 1 \end{cases}$$

$$(c) \begin{cases} 7x + 5y - 7z = -10 \\ 2x + y + z = 7 \\ x + y - 3z = -8 \end{cases}$$

$$(f) \begin{cases} -3x + y + z + 2w = 0 \\ 6x - 2y - 2z + w = -5 \\ 3x - y + 3z + 3w = -5 \\ -3x + 2y + z - w = 4 \end{cases}$$

4. Solve the following system for α , β , and γ :

$$\begin{cases} \ln \alpha - \ln \beta - \ln \gamma = 2 \\ 3 \ln \alpha + 5 \ln \beta - 2 \ln \gamma = 1 \\ 2 \ln \alpha - 4 \ln \beta + \ln \gamma = 2 \end{cases}$$

5. Find all real solutions (x, y) to the following nonlinear systems of equations:

$$(a) \begin{cases} y = x + 3 \\ y = 9 - x^2 \end{cases}$$

$$(f) \begin{cases} 2x^{-2} + 5y^{-2} = 3 \\ 3x^{-2} - 2y^{-2} = 1 \end{cases}$$

$$(b) \begin{cases} 3x + 4y = 12 \\ x^2 - y + 1 = 0 \end{cases}$$

$$(g) \begin{cases} y = -\sqrt{x} \\ (x - 3)^2 + y^2 = 4 \end{cases}$$

$$(c) \begin{cases} x + 2y = 0 \\ xy = -2 \end{cases}$$

$$(h) \begin{cases} y = -\sqrt{x - 6} \\ (x - 3)^2 + y^2 = 4 \end{cases}$$

$$(d) \begin{cases} x - 2y = 1 \\ y^2 - x^2 = 3 \end{cases}$$

$$(i) \begin{cases} y = e^{4x} \\ y = e^{2x} + 6 \end{cases}$$

$$(e) \begin{cases} xy = 4 \\ y = 4x \end{cases}$$

$$(j) \begin{cases} y = \log_2(x + 1) \\ y = 5 - \log_2(x - 3) \end{cases}$$

6. Solve the following system for x and y in terms of a and b . You may assume that a and b are positive.

$$\begin{cases} \frac{1}{x^2} + \frac{1}{xy} = \frac{1}{a^2} \\ \frac{1}{y^2} + \frac{1}{xy} = \frac{1}{b^2} \end{cases}$$