MATH 117: Makeup Work

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Due: 12/31/2020 11:59pm

Please show your work for the following problems. These problems have solutions that are easily found online, so most of your grade will be based on explaining how we get the solution that we get.

Problems 1 - 6 will be applied as homework problems.

1

Find x and y in terms of a, b. Only using methods used in Section 10.1.

$$\begin{cases} ax + by & = 0 \\ a^2x + b^2y & = 0 \end{cases} (a \neq 0, b \neq 0, a \neq b)$$

2

Find x and y in terms of a and b. Only using methods used in Section 10.1.

$$\begin{cases} ax + by & = 1 \\ bx + ay & = 1 \end{cases} (a^2 - b^2 \neq 0)$$

3

Solve the system, or show that it has no solution. If the system has infinitely man solutions, express them in the ordered pair form given in Example 6 in Section 10.1. Using only methods from 10.1.

$$\begin{cases} 0.2x - 0.2y & = -1.8 \\ -0.3x + 0.5y & = 3.3 \end{cases}$$

4

Find the complete solution of the linear system, or show that it's inconsistent. Only use the methods used in Section 10.2.

4.1

$$\begin{cases} x - 2y + 3z & = -10 \\ 3y + z & = 7 \\ x + y - z & = 7 \end{cases}$$

4.2

$$\begin{cases} x + y + z & = 0 \\ -x + 2y + 5z & = 3 \\ 3x - y & = 6 \end{cases}$$

4.3

$$\begin{cases} x - y + 2z & = 2 \\ 3x + y + 5z & = 8 \\ 2x - y - 2z & = -7 \end{cases}$$

5

Convert the following system of equations to a matrix and use row operations to solve for the unknowns.

5.1

$$\begin{cases} x - 3y + 2z + w & = -2 \\ x - 2y - 2w & = -10 \\ z + 5w & = 15 \\ 3x + 2z + w & = -3 \end{cases}$$

5.2

$$\begin{cases} 3x - y + 2z & = -1 \\ 4x - 2y + z & = -7 \\ -x + 3y - 2z & = -1 \end{cases}$$

5.3

$$\begin{cases} 3x + y & = 2 \\ -4x + 3y + z & = 4 \\ 2x + 5y + z & = 0 \end{cases}$$

6

The matrices A, B, C are defined as follows.

$$A = \begin{bmatrix} 0.3 & 1.1 & 2.4 \\ 0.9 & -0.1 & 0.4 \\ -0.7 & 0.3 & -0.5 \end{bmatrix}, B = \begin{bmatrix} 1.2 & -0.1 \\ 0 & -0.5 \\ 0.5 & -2.1 \end{bmatrix}, C = \begin{bmatrix} -0.2 & 0.2 & 0.1 \\ 1.1 & 2.1 & -2.1 \end{bmatrix}.$$

Using a graphing calculator (or any online calculator) to carry out the indicated algebraic operation, or explain why it cannot be performed.

6.1

$$BC$$

6.2

$$B + C$$

6.3

$$A^2$$

7

Solve the system of equations by converting to a matrix equation, show your work through row operations.

$$\begin{cases} x + y + z + w & = 15 \\ x - y + z - w & = 5 \\ x + 2y + 3z + 4w & = 26 \\ x - 2y + 3z - 4w & = 2 \end{cases}$$

All the following problems will be counted as part of the final exam.

8

Solve the matrix equation by multiplying each side by the appropriate inverse matrix.

$$\begin{bmatrix} 3 & -2 \\ -4 & 3 \end{bmatrix} \begin{bmatrix} x & y & z \\ u & v & w \end{bmatrix} = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & 3 \end{bmatrix}$$

9

Find the inverse of the matrix. For what value(s) of x, if any, does the matrix have no inverse?

$$\begin{bmatrix} e^x & -e^{2x} \\ e^{2x} & e^{3x} \end{bmatrix}$$

10

Solve for x, where the left-hand side of the equation is the determinant of that matrix:

$$\begin{vmatrix} a & b & x-a \\ x & x+b & x \\ 0 & 1 & 1 \end{vmatrix} = 0.$$

11

Show that (again a determinant on the left-hand side)

$$\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = (x-y)(y-z)(z-x).$$

Hint: foil out the right hand side.

12

Only one of the following matrices has an inverse. Find the determinant of each matrix, and use the determinants to identify the one that has an inverse. Then find the inverse.

$$A = \begin{bmatrix} 1 & 4 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 1 \end{bmatrix} \; B = \begin{bmatrix} 1 & 4 & 0 \\ 0 & 2 & 0 \\ -3 & 0 & 1 \end{bmatrix}$$

13

Find a fourth-degree polynomial with integer coefficients that has zeros $3i$ and -1, with -1 a zero of multiplicity 2.

14

Consider the following rational functions

$$r(x) = \frac{2x-1}{x^2-x-2}, s(x) = \frac{x^3+27}{x^2+4}, t(x) = \frac{x^3-9x}{x+2}, u(x) = \frac{x^2+x-6}{x^2-25}, w(x) = \frac{x^3+6x^2+9x}{x+3}$$

14.1

Which of these rational functions has a horizontal asymptote?

14.2

Which of these functions has **no** vertical asymptote?

14.3

What are the asymptotes of the function $r(x)$?

14.4

Sketch $y = u(x)$ showing clearly any asymptotes and $x-$ and $y-$ intercepts the function may have.

14.5

Use long division to find a polynomial P that has the same end behavior as $t(x)$. Graph both P and t on the same screen to verify that they have the same end behavior.

15

Use the Laws of Logarithms to combine the expression into a single logarithm.

15.1

(Where $\log(x) = \log_{10}(x)$) $\log(a) + 2\log(b)$

15.2

$\ln(x^2 - 25) - \ln(x + 5)$

15.3

$\log_2(3) - 3\log_2(x) + \frac{1}{2}\log_2(x + 1)$

16

Solve the logarithmic equation for x.

16.1

$\log(2x) = 3$

16.2

$\log(x+1) + \log(2) = \log(5x)$

16.3

$5\ln(3-x) = 4$

16.4

$\log_2(x+2) + \log_2(x-1) = 2$

17

17.1

Write the equation $6^{2x} = 25$ in logarithmic form.

17.2

Write the equation $\ln(A) = 3$ in exponential form.