Honors Pre-Calc Test Chapter 7 (2017)

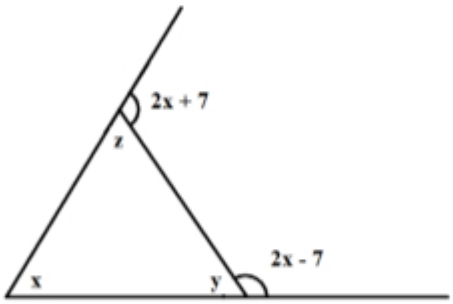
Show ALL work for full credit!!! Circle ALL final answers!!! Leave any general solutions in terms of Z!!!

Short answer

1. Describe m and n so the system has no solutions.

$$\begin{cases} mx + 3y = n \\ 4x - 5y = 9 \end{cases}$$

2. Find the values of x, y, and z in the figure. (angle measurements are in degrees)



3. Solve the following system:

$$\begin{cases} 2x + y - z = 7 \\ x - 2y + 2z = -9 \\ 3x - y + z = 5 \end{cases}$$

4. Solve the following system:

$$\begin{cases} x^2 + y^2 = 169 \\ x^2 - 8y = 104 \end{cases}$$

5. Solve the following system:

$$\begin{cases} x - 3y + 2z = 18 \\ 5x - 13y + 12z = 80 \end{cases}$$

6. What are the dimensions of a rectangular piece of land if its perimeter is 44 kilometers and its area is 120 sq. kilometers?

7. Find the equation of the parabola: $y = ax^2 + bx + c$ that passes through (2, 0), (3, -1) and (4, 0).

8. A chemist needs 10 liters of a 25% acid solution. The solution is to be mixed from three solutions whose concentrations are 10%, 20%, and 50%. How many liters of each solution will be used if the chemist wishes to use the least amount of the 50% solution as possible?

9. An airplane flying into a headwind travels the 1800-mile flying distance between Pittsburgh and Phoenix in 3 hours and 36 minutes. On the return flight, the distance is traveled in 3 hours.

a) Find the airspeed of the plane.

b) Find the wind speed.

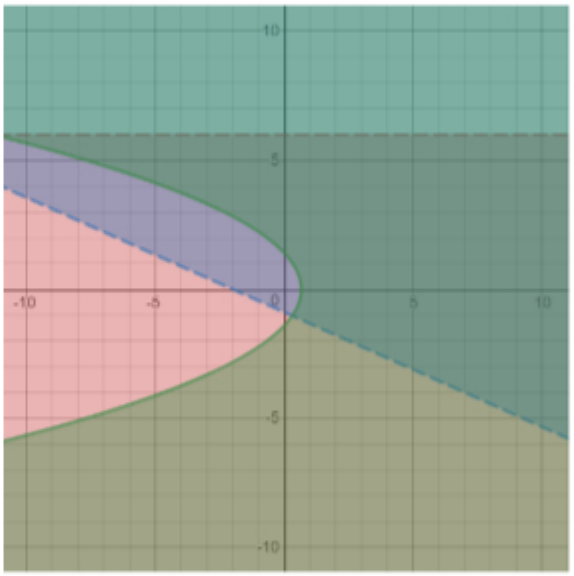
10. Write the partial fraction decomposition of the rational expression:

$$\frac{3}{x^4 + x}$$

11. Write the partial fraction decomposition of the improper rational expression:

$$\frac{x^4}{(x-1)^3}$$

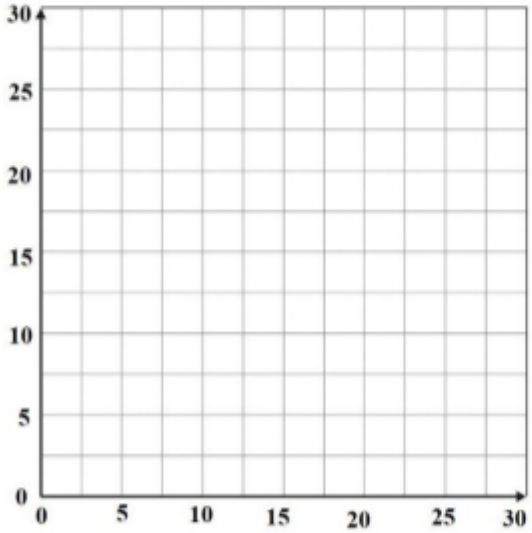
12. Write the system of inequalities that has the following solution:



13. A humanitarian agency can use two models of vehicles for a refugee rescue mission. Each Model-A vehicle costs $1000 and each Model-B vehicle costs $1500. Mission strategies and objectives indicate the following constraints:
    - A total of at least 20 vehicles must be used.
    - A Model-A vehicle can hold 45 supply boxes. A Model-B can hold 30. The agency must deliver at least 690 boxes to the refugee camp.
    - A Model-A vehicle can hold 20 refugees. A Model-B can hold 32. The agency must rescue at least 520 refugees.

    a) Write a system of inequalities modeling the constraints

    b) Graph the system of inequalities



c) Write the objective function

d) List all the vertices of the feasible region

e) What is the optimal number of each vehicle?

f) What is the optimal cost?