

University of South Carolina
Math 115: Precalculus
Instructor: Austin Mohr
Section 006
Fall 2009

Test 4

Do not write on this page. Instead, use the blank paper provided to show all your work and answers. Credit will not be given if no work is shown.

1. Word Problem

Your instructor uncovers an ancient tome with a ritual for achieving blood alcohol content of 1.00 - he will become a being of pure alcohol. The inscription is translated as follows:

The fount of transcendence brims with vodka and tequila.

The total number of shots is to be 100.

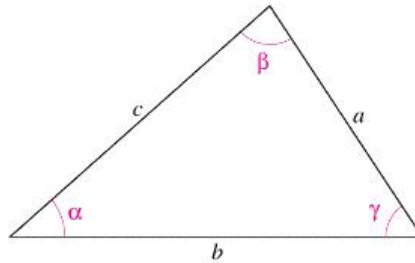
Each shot of vodka will measure 45 mL.

Each shot of tequila will measure 55 mL.

The total volume of all drinks consumed will be 5150 mL.

How many shots of vodka and how many shots of tequila must he consume in order to free himself from the prison of blood and bone?

2. Triangles



- a. Solve the triangle above given that $\alpha = 39.5^\circ$, $b = 5.8$, and $c = 3.6$.
- b. How many triangles can be formed if $\alpha = 38^\circ$, $a = 4.7$, and $c = 5.9$? How do you know?

3. Partial Fractions

- a. Find the partial fraction decomposition for $\frac{2x-3}{(x-1)(x+3)}$.
- b. Set up but do not solve the partial fraction decomposition for $\frac{4x^2-4x-4}{(x+1)^2(x-1)^3}$.
- c. Set up but do not solve the partial fraction decomposition for $\frac{x^3+2x^2+3x+3}{(x+1)(x^3+2x^2+2x+2)}$.
(Hint: The polynomial $x^3 + 2x^2 + 2x + 2$ is irreducible.)

4. Systems of Inequalities

a. Graph the solution to the system of inequalities.

$$\begin{aligned}x - y &< 1 \\ y + 4 &\leq x\end{aligned}$$

b. Graph the solution to the system of inequalities.

$$\begin{aligned}x^2 + y^2 &\leq 1 \\ y &\geq -|x| + 1 \\ x &\leq 0\end{aligned}$$

5. Systems of Equations

a. Solve the system of equations. Your answer will not be unique.

$$\begin{aligned}x^2 + y^2 &= 5 \\ 4x^2 + 9y^2 &= 35\end{aligned}$$

b. Solve the system of equations. Your answer will not be unique.

$$\begin{aligned}x + y + z &= 1 \\ x - y - z &= 3 \\ 3x + y + z &= 5\end{aligned}$$

Extra Credit

Solve the system of equations. Your answer will be unique.

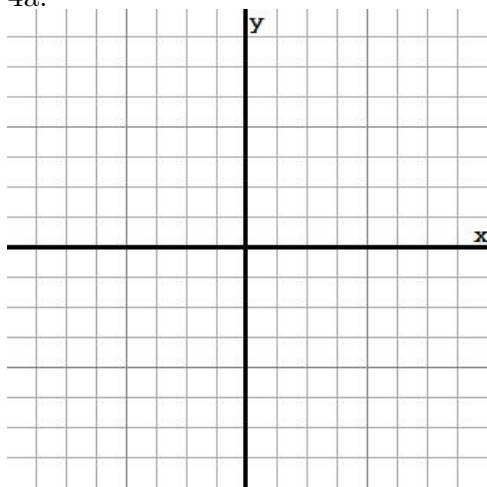
(Hint: The addition and substitution methods will take way too long. We did one example of another way to solve systems of equations.)

$$\begin{aligned}-w + x - y + z &= 2 \\ -w - x + 2y - z &= -1 \\ w + 2x - y - z &= 4 \\ -3w + x + 3y - 2z &= 6\end{aligned}$$

Answer Sheet

Use the axes provided to graph your solution to problems 4a and 4b.

4a.



4b.

