



(5pts) \_\_\_\_\_ 1. A jet is traveling with no wind at 370 miles per hour with a heading of  $N45^\circ W$ . It encounters a wind of 58 miles per hour in the direction of  $N60^\circ W$ . What is the resultant speed of the jet to the nearest mile per hour?

(5pts) \_\_\_\_\_ 2. Find the **exact** value of  $\cos\left(\sin^{-1}\frac{-4}{7}\right)$ .

(5pts) \_\_\_\_\_ 3. **Exactly** find the  $\sin 2x$  if  $\tan x = \frac{-5}{8}$  and  $\sin x < 0$ .

(5pts) 4. Verify the identity:  $\cos \theta \cot \theta + \sin \theta = \csc \theta$

(5pts) \_\_\_\_\_ 5. By using appropriate formulas, find the **exact** value for  $\cos \frac{13\pi}{12}$ .

(5 pts) \_\_\_\_\_ 6. **Exactly** and algebraically solve the system of equations to find all the solutions. Give the answer as a point.

$$11x + 8y = -198$$

$$5y = -4x + 20$$

(6pts) 7. Solve triangle(s) ABC if  $\angle A = 42^\circ$ ,  $a = 23$  and  $b = 32$ . If needed, round to two decimal places.

\_\_\_\_\_  $\angle B$

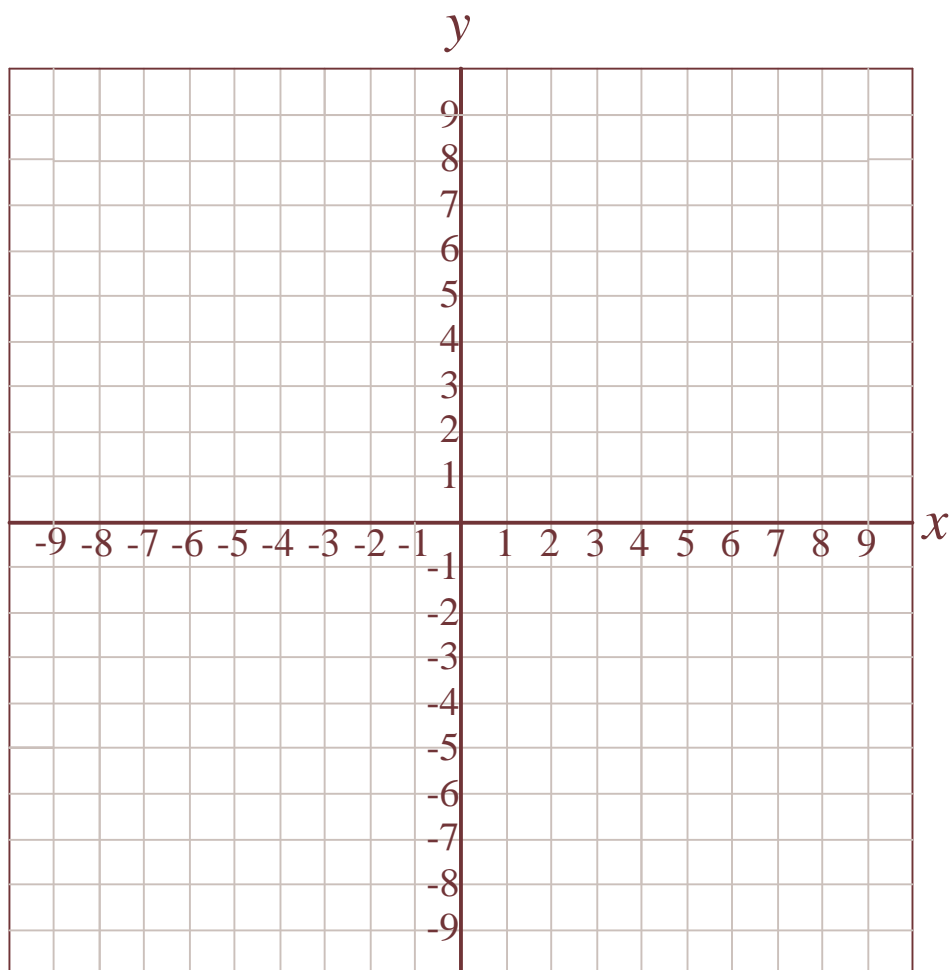
\_\_\_\_\_  $\angle C$

\_\_\_\_\_  $c$

(5pts) 8. Graph the system of inequalities. Shade only the solution set.

$$x^2 + y^2 \leq 16$$

$$y > -x - 1$$



(4pts – 2 pts each) 9. Let  $\mathbf{u} = -5\mathbf{i} + 3\mathbf{j}$  and let  $\mathbf{v}$  have initial point  $(2, -1)$  and terminal point  $(1, 8)$ .

\_\_\_\_\_ a. Find the angle, in degrees to two decimal places, of the angle between  $\mathbf{u}$  and  $\mathbf{v}$ .

\_\_\_\_\_ b. Find the projection of  $\mathbf{u}$  onto  $\mathbf{v}$ .

(5pts)  $x =$  \_\_\_\_\_ 10. Exactly solve  $\tan x \cos x - \frac{\sqrt{2}}{2} \tan x = 0$  on the interval  $[0, 2\pi)$ .