Name: _____ Exam Score: _____ /100

.   *105 pts available*

Exam 3 Part I: NO CALCULATORS.

You must turn this part in before picking up your calculator.

1. (24 pts) Give the exact value of each of the following or state "undefined."

   (a) $\sin^{-1}\left(-\dfrac{1}{\sqrt{2}}\right) = $ _____

   (b) $\cos^{-1}(0) = $ _____

   (c) $\tan^{-1}\left(-\dfrac{1}{\sqrt{3}}\right) = $ _____

   (d) $\cos^{-1}(0) = $ _____

   (e) $\sin\left(\sin^{-1}\left(\dfrac{20}{19}\right)\right) = $ _____

   (f) $\cos\left(\cos^{-1}\left(\dfrac{19}{20}\right)\right) = $ _____

   (g) $\tan\left(\tan^{-1}\left(-\dfrac{45}{2}\right)\right) = $ _____

   (h) $\sin^{-1}\left(\sin\left(\dfrac{23\pi}{20}\right)\right) = $ _____

   (i) $\cos^{-1}\left(\cos\left(\dfrac{3\pi}{20}\right)\right) = $ _____

   (j) $\sin^{-1}\left(\sin\left(-\dfrac{7\pi}{20}\right)\right) = $ _____

   (k) $\cos^{-1}\left(\cos\left(-\dfrac{7\pi}{20}\right)\right) = $ _____

   (l) $\tan^{-1}\left(\tan\left(-\dfrac{7\pi}{20}\right)\right) = $ _____

2. (10 pts) Find all real solutions, in radians. $\tan^2(3x) - 1 = 0$

3. (10 pts) Find all real solutions, in radians. $\sin(2x) - \sin x = 0$

Name: _____ .

## Exam 3 Part II: Calculators permitted.

No sharing of calculators.

4. (20 points) Use the Law of Sines or the Law of Cosines to find the requested value. If two solutions exist, find both. If no solution exists, explain why not. Assume triangles are labeled in the standard way (angle A opposite side a, etc.). Sketch and label a triangle for each solution, roughly to scale. *Round your answers to the nearest degree. Justify your answers.*
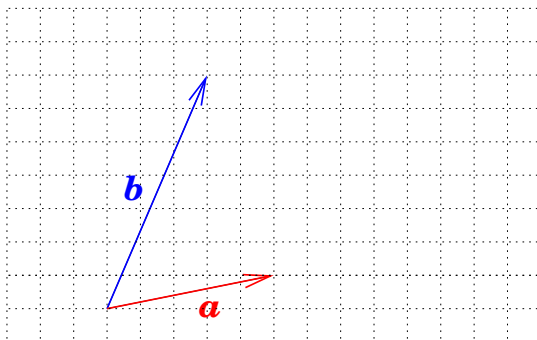
   (a) Find a if $b = 5.2$, $c = 8.1$, and $A = 23°$.

   (b) Find B if $C = 41°$, $b = 10$, $c = 13$.

5. (15 points) Fire tower B is located 30 miles at a direction of $45°$ from fire tower A. A ranger in fire tower A spots a fire at a direction of $295°$. A ranger in fire tower B spots the same fire at a direction of $255°$. How far from tower A is the fire?
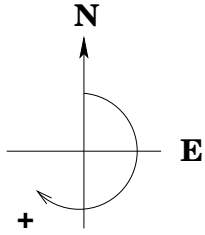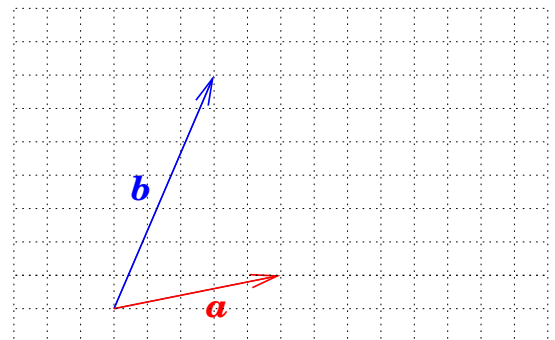

6. (6 points) Sketch each of the requested vectors.

(a) Sketch $\vec{a} + \vec{b}$

(b) Sketch $\vec{a} - \vec{b}$

7. (10 points) If $\vec{u} = <5, -2>$ and $\vec{v} = <-4, 7>$, evaluate each of the following.

(a) $\vec{u} + \vec{v} = $ _____

(b) $|\vec{u}| = $ _____

(c) $5\vec{u} - 3\vec{v} = $ _____

(d) $\dfrac{\vec{u}}{|\vec{u}|} = $ _____

(e) $\vec{u} \cdot \vec{v} = $ _____

8. (10 points) Suppose $|\vec{w}| = 10$ and the direction angle of $\vec{w}$ is $135°$.

(a) Write $\vec{w}$ in component form.

(b) Find a unit vector that has the same direction as $\vec{w}$.