MAT 104: Exam 2 **Name:** _____
Spring – 2023
04/13/2023
85 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 16 pages (including this cover page) and 15 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

Question	Points	Score
1	15	
2	15	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
11	10	
12	10	
13	10	
14	10	
15	10	
Total:	160	

1. (15 points) Complete the table of exact values for the trigonometric figures given below.

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin\theta$					
$\cos\theta$					
$\tan\theta$					

2. (15 points) Compute the exact values for the trigonometric functions given below.

   (a) $\cos\left(\frac{5\pi}{6}\right)$

   (b) $\tan\left(\frac{4\pi}{3}\right)$

   (c) $\sin\left(-\frac{7\pi}{4}\right)$

   (d) $\tan\left(\frac{3\pi}{2}\right)$

   (e) $\sec\left(\frac{\pi}{4}\right)$

   (f) $\cot(\pi)$

   (g) $\csc\left(\frac{2\pi}{3}\right)$

3. (10 points) Compute the exact values (in radians) for the inverse trigonometric functions given below.

   (a) $\sin^{-1}\left(-\frac{1}{2}\right)$

   (b) $\arccos\left(\frac{1}{2}\right)$

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

   (d) $\arcsin\left(\sin\left(\frac{7\pi}{6}\right)\right)$

   (e) $\arctan(\infty)$

4. (10 points) Given the right triangle below, compute the exact values of the indicated trigonometric functions.

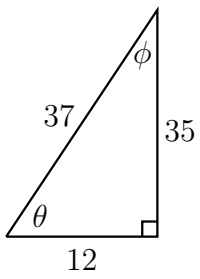
   (a) $\sin\theta$

   (b) $\cos\phi$

   (c) $\tan\theta$

   (d) $\sec\theta$

   (e) $\csc\phi$



5. (10 points) Showing all your work, compute the expressions given below.

   (a) $\sin(2\theta)$, if $\tan(\theta) = \dfrac{4}{3}$ and $0 < \theta < \dfrac{\pi}{2}$

   (b) $\tan\left(\cos^{-1}\left(-\dfrac{3}{4}\right)\right)$

6. (10 points) Complete the parts given below.

   (a) Find the value of $\sin^2(1-x) + \cos^2(1-x)$.

   (b) Express $\sin(\theta \pm \phi)$ in terms of $\sin\theta$, $\sin\phi$, $\cos\theta$, and $\cos\phi$.

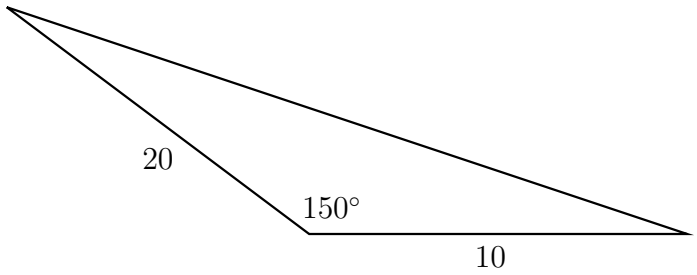
   (c) Express $\cos(2\theta)$ in terms of $\cos\theta$ and $\sin\theta$.

   (d) Express $\sin^2\theta$ in terms of $\cos(2\theta)$.

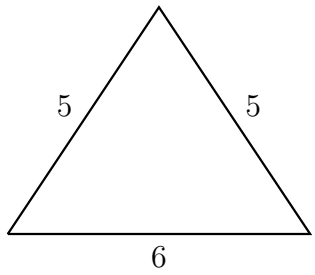
   (e) Express $\cos^2\theta$ in terms of $\cos(2\theta)$.

7. (10 points) Given that $\dfrac{11\pi}{12} = \dfrac{5\pi}{4} - \dfrac{\pi}{3}$, compute the exact value of $\cos\left(\dfrac{11\pi}{12}\right)$.

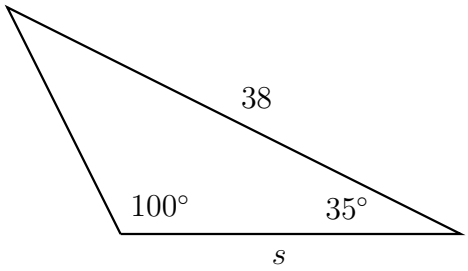
8. (10 points) Compute the exact area of the triangle shown below.



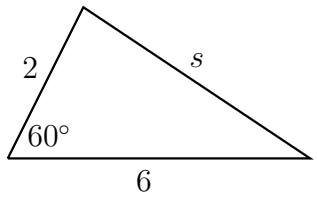
9. (10 points) Compute the exact area of the triangle shown below.



10. (10 points) Find the exact value of the side s in the triangle below.



11. (10 points) Find the exact value of the side s in the triangle below.



12. (10 points) Verify the trigonometric identity given below.

$$\frac{\tan\theta - \cot\theta}{\sin\theta\cos\theta} = \sec^2\theta - \csc^2\theta$$

13. (10 points) Verify the trigonometric identity given below.

$$\frac{\sin x}{1+\cos x} + \frac{\cos x - 1}{\sin x} = 0$$

14. (10 points) Find all the solutions to the equation below.

$$3\sin\theta = \sqrt{3}\cos\theta$$

15. (10 points) Find all the solutions to the equation below.

$$2\cos(2x)\sin x + \cos(2x) = 0$$