MATH1060: Midterm 1 Practice Exam

The following are practice problems for the first exam.

1. Convert the following angles from degrees to radians:

   (a) $105° = \dfrac{7\pi}{12}$

   (b) $-315° = \dfrac{-7\pi}{4}$

   (c) $225° = \dfrac{5\pi}{4}$

2. Convert the following angles from radians to degrees:

   (a) $\dfrac{5\pi}{6} = 150°$

   (b) $\dfrac{7\pi}{4} = 315°$

   (c) $2 = \dfrac{360}{\pi}$

3. For each angle given, find a coterminal angle such that $0 \le \theta < 2\pi$:

   (a) $\dfrac{27\pi}{4}$. Answer $\dfrac{3\pi}{4}$

   (b) $\dfrac{115\pi}{6}$. Answer $\dfrac{7\pi}{6}$

   (c) $-\dfrac{90\pi}{5}$. Answer 0

4. For each of the following angles, find $\sin\theta$, $\cos\theta$, and $\tan\theta$:

   (a) $\theta = \dfrac{7\pi}{6}$. $\sin\theta = \dfrac{-1}{2}$, $\cos\theta = \dfrac{-\sqrt{3}}{2}$, $\tan\theta = \dfrac{\sqrt{3}}{3}$.

   (b) $\theta = \dfrac{\pi}{4}$. $\sin\theta = \dfrac{\sqrt{2}}{2}$, $\cos\theta = \dfrac{\sqrt{2}}{2}$, $\tan\theta = 1$.

   (c) $\theta = -\dfrac{\pi}{2}$. $\sin\theta = -1$, $\cos\theta = 0$, $\tan\theta =$ undefined.

5. Compute:

   (a) $\csc\dfrac{2\pi}{3} = \dfrac{2\sqrt{3}}{3}$

   (b) $\cot\dfrac{\pi}{2} = 0$

   (c) $\sec\dfrac{5\pi}{4} = -\sqrt{2}$

6. Find the area of a sector of a circle of radius 5 with central angle $\dfrac{3\pi}{4}$. Answer: $\dfrac{75\pi}{8}$.

7. Find the length of an arc cut out by a central angle of $\dfrac{5\pi}{6}$ in a circle of radius 3. Answer: $\dfrac{5\pi}{2}$.

8. Practice filling in the unit circle just like the quiz.

9. Take a right triangle with side lengths $5, 12$, and 13, and let θ be the angle opposite the side of length 5. Find

   (a) $\csc\theta = \dfrac{13}{5}$

   (b) $\sin(90° - \theta) = \dfrac{12}{13}$

   (c) $\cos\theta = \dfrac{12}{13}$

   (d) $\tan(90° - \theta) = \dfrac{12}{5}$

10. If $\sin\theta = \sqrt{2/3}$, find $\cos\theta$ using one of the Pythagorean identities. Answer: $\dfrac{\sqrt{3}}{3}$

11. Show that $\dfrac{\sin\theta}{\cos\theta} + \dfrac{\cos\theta}{\sin\theta} = \csc\theta\sec\theta$.

12. Show that $\sec^2\theta + \csc^2\theta - \tan^2\theta - \cot^2\theta = 2$.

13. You are skiing down a mountain with a vertical height of 1500 feet. The distance from the top of the mountain to the base is 3000 feet. What is the angle of elevation from the base to the top of the mountain. Answer: $\theta = 30°$

14. Suppose $\cos\theta = \dfrac{\sqrt{3}}{2}$ and θ is in quadrant IV. Find θ. Answer: $\theta = -\dfrac{\pi}{6}$

15. Suppose $\tan\theta = \sqrt{3}$ and θ is in quadrant III. Find θ. Answer: $\theta = \dfrac{4\pi}{3}$

16. Graph $y = 2\sin(5x)$. Answer: Use a calculator or the internet to check.

17. Graph $y = -\dfrac{1}{2}\cos(3x + 6) - 1$. Answer: Use a calculator or the internet to check.