MHF4U1 Assignment: Trigonometry

Part A) Knowledge and Understanding

Multiple Choice

Identify the choice that best completes the statement or answers the question.

1. The exact radian measure for an angle of 135° is:
   a. $\pi/4$
   b. $3\pi/4$
   c. $\pi/2$
   d. π

2. 7/8 of a revolution represents how many radians?
   a. $7\pi/4$
   b. 315
   c. $7\pi/8$
   d. 157.5

3. Determine the exact degree measure for $2\pi/5$.
   a. 36°
   b. 226°
   c. 72°
   d. 144°

4. Determine the approximate degree measure for an angle of 2.54 radians.
   a. 0.044°
   b. 457.2°
   c. 0.0254°
   d. 145.5°

5. Determine the exact value of $\cos(\pi/4)$.
   a. $1/\sqrt{2}$
   b. $\sqrt{2}$
   c. $\sqrt{3}/2$
   d. 1/2

6. Determine the exact value of $\sin(5\pi/6)$.
   a. $2/\sqrt{3}$
   b. 2
   c. $\sqrt{3}/2$
   d. 1/2

7. Determine the exact value of $\cot(5\pi/3)$.
   a. $1/\sqrt{3}$
   b. $\sqrt{3}$
   c. $-1/\sqrt{3}$
   d. 1/2

8. Determine the exact value of $\sin \pi$.
   a. 0
   b. -1
   c. 1
   d. undefined

9. Determine the exact value of $\sec(3\pi/2)$.
   a. 0
   b. -1
   c. 1
   d. undefined

10. Use your calculator to determine the value of sin 3.11, to three decimal places.
   a. 0.031
   b. 0.032
   c. 0.054
   d. 0.005

11. Use your calculator to determine the value of csc 4.37, to three decimal places.
   a. 0.076
   b. 13.124
   c. -1.062
   d. -0.942

Part B) Communication

A student claims that the identity $\sin^2 x + \cos^2 x = 1$ can be used to evaluate $\sin^2(2\pi/3)$ without a calculator. Explain clearly and mathematically how this identity can be used to determine $\sin^2(2\pi/3)$. Justify each step.

/3

Part C) Applications

1. Find the exact value of $\sin(7\pi/12)$ using a compound angle formula. /4

2. Find the exact value of $\cos(4\pi/3)$ using a co-related angle formula. /3

3. Determine the exact value of the following: /3
$(\cot(\pi/3) + \sec(\pi/6))(\sin(\pi/2) - (2/3)\sin(\pi/6))$.

4. An athletic facility has a circular outdoor running track with a diameter of 32 m. A runner ran along the arc of the track for 60 m. What is the sector angle, in degrees, from the start to the finish of her run? /3

5. The "Big Wheel" on The Price is Right rotates 12 times per minute. Determine its angular velocity in radians per second, in exact form and to the nearest hundredth. /3

6. If $\sin A = 3/5$ for $\pi/2 \leq A \leq \pi$, and $\tan B = -3/4$ for $3\pi/2 \leq B \leq 2\pi$, then find the values of: /7

(a) $\cos(A + B)$

(b) $\sin 3B$

7. Express as a single trigonometric function, and then determine the exact value. /3

$\sin(11\pi/6)\cos(2\pi/3) - \cos(11\pi/6)\sin(2\pi/3)$

Part D) Thinking, Inquiry and Problem Solving

Prove the following trigonometric identities:

1. $$\frac{\sin(\pi - x)}{\tan(\pi + x)} \times \frac{\cot(\pi/2 - x)}{\tan(\pi/2 + x)} \times \frac{\cos(2\pi - x)}{\sin(-x)} = \sin x$$ /4

2. $\sin^2 x + \tan^2 x + \cos^2 x = \sec^2 x$ /3