

Chapter 4 – MHF 4U: Trigonometry Review and Practice

Radian Measure

- Determine the exact radian measure of each of the following angles.
 - 75°
 - 20°
 - 12°
 - 9°
- Determine the exact degree measure for each of the following angles.
 - $\frac{2\pi}{5}$
 - $\frac{4\pi}{9}$
 - $\frac{7\pi}{12}$
 - $\frac{11\pi}{18}$

Special Values of Trigonometric Functions

- Use technology to determine the six trigonometric ratios of the angle $x = \frac{3\pi}{6}$. Answer correct to four decimal places.
- Use technology to determine the six trigonometric ratios of the angle $x = \frac{15\pi}{8}$. Answer correct to four decimal places.

Equivalent Trigonometric Expressions

- Find 3 other trigonometric expressions that are equal to $\tan \frac{\pi}{6}$. Show their equivalence on a unit circle.
- If $\sin x = \frac{2}{\sqrt{5}}$, find the exact values of the five other trigonometric functions.
- For each function, find the quadrant containing the angle, the related acute angle, and the exact value of the given function
 - $\sec \frac{-7\pi}{4}$
 - $\cos \frac{5\pi}{3}$
 - $\tan \frac{11\pi}{4}$
- Write each of the following in terms of the cofunction identity:
 - $\sin \frac{\pi}{11}$
 - $\cot \frac{3\pi}{8}$
 - $\sin \frac{2\pi}{17}$
 - $\cos \frac{5\pi}{12}$
 - $\cos \frac{\pi}{8}$
 - $\csc \frac{\pi}{9}$
- Find each function value (keep answers in radical form):
 - $\cos \theta$ if $\tan \theta = \frac{\sqrt{6}}{12}$
 - $\sin \theta$ if $\cot \theta = \frac{-\sqrt{5}}{2}$

Addition/Subtraction and Double Angle Formulas

- Express as a single trigonometric function and then evaluate.
 - $\sin \frac{11\pi}{12} \cos \frac{\pi}{6} - \cos \frac{11\pi}{12} \sin \frac{\pi}{6}$
 - $\cos \frac{\pi}{4} \cos \frac{\pi}{12} + \sin \frac{\pi}{4} \sin \frac{\pi}{12}$
- Determine an exact value for each.
 - $\cos \left(\frac{13\pi}{12} \right)$
 - $\sin \left(\frac{17\pi}{12} \right)$

c. $\sin\left(\frac{19\pi}{12}\right)$

d. $\cos\left(\frac{23\pi}{12}\right)$

12. Angle x lies in the second quadrant, and $\sin x = \frac{7}{25}$.

- Determine an exact value for $\cos 2x$.
- Determine an exact value for $\sin 2x$.
- Use a calculator to determine an approximate measure for x in radians.

Proving identities

13. Use double angle identities, addition and subtraction formulas, reciprocal identities, Pythagorean Identity or Quotient Identity to show Left Side = Right Side.

a. $\sin\left(\frac{3\pi}{2} - x\right) = -\cos x$

b. $\cos(\pi - x) = -\cos x$

c. $\cos x = \sin x \cot x$

d. $1 + \sin x = \sin x(1 + \csc x)$

e. $\frac{\sin 2x}{2\sin x} = \frac{1 - \sin^2 x}{\cos x}$

f. $\frac{1}{\cos x} + \tan x = \frac{\cos x}{1 - \sin x}$

g. $1 - 2\tan x + \tan^2 x = \frac{1 - \sin 2x}{\cos^2 x}$

h. $\cos 2x = \cos^4 x - \sin^4 x$

i. $2\sin x \sin y = \cos(x - y) - \cos(x + y)$

Answers:

1. a) $\frac{5\pi}{12}$ b) $\frac{\pi}{9}$ c) $\frac{\pi}{15}$ d) $\frac{\pi}{20}$

2. a) 72 b) 80 c) 105 d) 110

3. 0.9511, -0.3090, -3.0777, 1.0514, -3.2361, -0.3249

4. -0.3827, 0.9238, -0.4142, -2.6131, 1.0823, -2.4142

5. $\tan \frac{7\pi}{6}$, $\cot \frac{\pi}{3}$, $\cot \frac{4\pi}{3}$

6. $\frac{2}{\sqrt{5}}$, $\frac{\sqrt{5}}{2}$, $\frac{1}{\sqrt{5}}$, $\sqrt{5}$, 2, $\frac{1}{2}$

7. a) $\frac{\pi}{4}$, $\sqrt{2}$ b) $\frac{\pi}{3}$, $\frac{1}{2}$ c) $\frac{\pi}{4}$, -1

8. a) $\cos \frac{9\pi}{22}$ b) $\tan \frac{\pi}{8}$ c) $\cos \frac{13\pi}{34}$ d) $\sin \frac{\pi}{12}$

e) $\sin \frac{3\pi}{8}$ f) $\sec \frac{7\pi}{18}$

9. a) $\frac{12}{5\sqrt{6}}$ b) $-\frac{2}{3}$

10. a) $\frac{1}{\sqrt{2}}$ b) $\frac{\sqrt{3}}{2}$

11. a) $\frac{-1-\sqrt{3}}{2\sqrt{2}}$ b) $\frac{-1-\sqrt{3}}{2\sqrt{2}}$ c) $\frac{-1-\sqrt{3}}{2\sqrt{2}}$ d) $\frac{1+\sqrt{3}}{2\sqrt{2}}$

12. a) $\frac{527}{625}$ b) $-\frac{336}{625}$ c) 0.2838

13. See Course Website for detailed solutions

