

Name _____

Calculus Honors & AP Summer Review:

SHOW ALL WORK!

Part 1: Trigonometry

Draw each angle in the appropriate Quadrant. Draw a reference triangle and determine the **EXACT** value of the trigonometric function without the use of a calculator.

1. $\sin \frac{3\pi}{2}$

2. $\tan 135^\circ$

3. $\cos \left(-\frac{\pi}{6}\right)$

4. $\sec \frac{2\pi}{3}$

5. $\cot \frac{5\pi}{3}$

6. $\csc \pi$

3. $\sin \frac{7\pi}{6}$

8. $\csc \frac{5\pi}{4}$

9. $\tan \left(-\frac{5\pi}{6}\right)$

Given that $0 \leq \theta < 2\pi$, draw a reference triangle and determine the **EXACT** values of θ , in radians, that make each statement true without using a calculator:

10. $\cos \theta = -\frac{1}{2}$

11. $\sin \theta = -\frac{\sqrt{2}}{2}$

12. $\tan \theta = \frac{\sqrt{3}}{3}$

13. $\cot \theta = -1$

14. $\sec \theta = \sqrt{2}$

15. $\csc \theta = -2$

16. $\tan \theta = 0$

17. $\sec \theta$ is undefined

Determine the **EXACT** value of each expression without using a calculator.

18. $\csc^{-1} 1$

19. $\operatorname{arcsec} \frac{2\sqrt{3}}{3}$

20. $\tan^{-1}(-1)$

21. $\cos^{-1} \left(-\frac{\sqrt{2}}{2} \right)$

22. $\arcsin \left(-\frac{1}{2} \right)$

Determine the **EXACT** value of each expression without using a calculator.

23. $\cot^{-1}\left(\cot\frac{\pi}{3}\right)$

24. $\sec\left(\sin^{-1}\left(-\frac{7}{25}\right)\right)$

25. $\tan\left(\cos^{-1}\left(\frac{3}{4}\right)\right)$

Use a calculator to evaluate each expression:
Round answers to the nearest ten-thousandth.

26. $\sin\frac{5\pi}{7}$

27. $\cos 2$

28. $\tan 103^\circ$

29. $\sec 42^\circ$

30. $\csc\left(-\frac{5\pi}{7}\right)$

31. $\cot 1.3$

Use a calculator to evaluate each expression:
Round answers to the nearest hundredth of a radian.

32. $\cos^{-1} 0.3325$

33. $\operatorname{arccot} 1.792$

34. $\csc^{-1}(-0.2383)$

35. $\sec^{-1} 3$

Verify each trigonometric identity:

$$36. \cos x \cot x + \sin x = \csc x$$

$$37. \frac{\sin x}{1+\cos x} + \frac{1+\cos x}{\sin x} = 2 \csc x$$

Solve for the **EXACT** values of x where $0 \leq x < 2\pi$:

$$38. 2 \cos^2 x + 3 \cos x - 2 = 0$$

$$39. 2 \cos^2 x = 2 \cos x$$

$$40. 2 \cos^2 x - 3 \sin x - 3 = 0$$

$$41. \sqrt{3} \tan 2x + 1 = 0$$

Part 2: Advanced Algebra

Simplify each expression:

1. $\frac{3x + \frac{x}{x+1}}{3x+3}$

2. $\frac{x}{x-1} - \frac{2x-1}{x+1}$

Determine whether the function is odd, even, or neither:

3. $f(x) = x^3 - x$

4. $f(x) = x^2 + 1$

5. Use long division to divide: $(8x^4 - 16x^3 + 16x^2 - 27x + 18) \div (2x - 3)$

Determine the domain and the range of each function:

6. $f(x) = x^3 - x$

7. $f(x) = x^2 - 3$

8. $f(x) = \frac{1}{x}$

9. $f(x) = |x - 3|$

Find all of the complex zeros of each function:

10. $f(x) = 12x^4 - 5x^2 - 2$

11. $f(x) = 9x^3 - 108x^2 + x - 12$

12. $f(x) = x^3 - 27$

13. $f(x) = x^5 + x^3 - 2x^2 - 12x - 8$

$$14. f(x) = \frac{3}{x}$$

$$15. f(x) = \frac{x^2-4}{x+1}$$

Solve each equation:

$$16. \ln x = 4$$

$$17. e^x = 8$$

$$18. 5^{3x-6} = 125$$

$$19. \ln \sqrt{x+4} = 1$$

$$20. \ln e^3 x^2 = 4 - \ln \frac{1}{x}$$

$$21. e^{2x} - e^x - 6 = 0$$

Part 3: Graphing

Graph each equation on a separate sheet of paper.

Label the x and y -intercepts and all of the important points on each graph.

1. $f(x) = -2 \sin x$

2. $f(x) = \tan x + 1$

3. $f(x) = \cos \frac{1}{2}x$

4. $f(x) = \csc \left(x - \frac{\pi}{2}\right)$

5. $f(x) = \cot 2x$

6. $f(x) = 3 \sec x - 2$

7. $f(x) = -x^2 + 2x - 3$

8. $f(x) = 2(x + 1)^2 + 3$

9. $f(x) = x(x - 3)(x + 2)^2$

10. $f(x) = -x^3(x + 2)(x - 5)$

11. $f(x) = \llbracket x \rrbracket$

12. $f(x) = \frac{1}{x+1}$

13. $f(x) = \frac{1}{x} + 1$

14. $f(x) = |x + 2|$

15. $f(x) = |x| + 2$

16. $f(x) = \sqrt[3]{x}$

17. $f(x) = \sqrt{-x - 3}$

18. $f = -\sqrt{x} - 3$

19. $(x - 2)^2 + y^2 = 9$

20. $9y^2 - 4x^2 = 36$

21. $f(x) = 2^x$

22. $f(x) = \ln(x - 2) + 1$

23. $f(x) = \begin{cases} 2x - 1, & x < 0 \\ \sqrt{x}, & x \geq 0 \end{cases}$

24. $f(x) = \begin{cases} x^2, & x > 0 \\ -2, & x \leq 0 \end{cases}$