Please complete this worksheet on a separate sheet of paper. Show all of your work! Copy down each problem.

1. Change the degree measure to radians.
   \[ 570^\circ \]

2. Change the radian measure to degrees.
   \[ \frac{4\pi}{5} \]

3. Find the length of the arc on a circle of radius 18 cm intercepted by a central angle of 40°.

4. A child is spinning a rock at the end of a two foot rope at a rate of 180 rpm. Find the linear speed, in miles per hour, of the rock when it is released.

5. Two pulleys, one with radius 4 inches and the other with radius 16 inches, are connected by a belt. If the small pulley is caused to rotate at 4 rpm, find the angular velocity, in radians per second, of the large pulley.

6. The owners of Rollerblades Plus determine that the monthly sales, \( S \), of its skates vary directly as its advertising budget, \( A \), and inversely with the price of the skates, \( P \). When $60,000 is spent on advertising and the price of the skates is $40, the monthly sales are 12,000 pairs of rollerblades. Find the monthly sales if the advertising budget is increased to $70,000 (assume the price of the skates doesn’t change).

7. Find the value of each of the six trig functions of \( \theta \).

8. Find the values of the missing trig functions given \( \sin \theta = -\frac{8}{17} \) and \( \cos \theta = \frac{15}{17} \).

9. The Washington Monument is 555 feet high. If you stand one quarter of a mile from the base of the monument and look to the top, find the angle of elevation to the nearest degree.

10. A road is inclined at an angle of 5°. After driving 5000 feet along this road, find the driver’s increase in altitude. Round to 2 decimal places.

11. A pilot flying at an altitude of 12,000 feet, spots a fire in the forest when his angle of depression to the fire is 8°. What is his horizontal distance from the fire? Round to 2 decimal places.

For questions 12-18, find the exact value of each expression.

12. \( \tan \frac{9\pi}{2} \)

13. \( \sec \frac{-11\pi}{4} \)

14. \( \sin \frac{-35\pi}{6} \)

15. \( \cot \frac{19\pi}{6} \)

16. \( \sec 510^\circ \)

17. \( \sin \frac{3\pi}{2} \tan \left(-\frac{8\pi}{3}\right) + \cos \left(-\frac{5\pi}{6}\right) \)

18. \( \frac{\tan 150^\circ \csc 240^\circ}{\cos 135^\circ - \sin 300^\circ} \)
For 19-20, graph each function by first graphing the parent function. State the equation of the asymptote, domain & range.

19. \( y = \frac{1}{2}x^{-3} - 6 \) 
20. \( y = \log_2(x + 4) + 3 \)

21. Expand: \( \log \frac{100x^{3\sqrt{5-x}}}{3(x+7)^2} \)

22. Condense: \( \log x + 2 \log(x^2 - 4) - 3 \log 5 - 6 \log(x + 2) + 4 \log(x - 1) \)

For questions 23-30, solve each equation. Round your answers to 4 decimal places.

23. \( 5^{x-2} = 4^{2x+3} \) 
24. \( e^{2x} - 8e^x + 7 = 0 \) 
25. \( \log x + \log(x - 3) = 1 \)

26. \( \ln(x - 5) - \ln(x + 4) = \ln(x - 1) - \ln(x + 2) \) 
27. \( \log_2(x - 1) + \log_2(x + 1) = 3 \)

28. \( 5^{2-x} = \frac{1}{125} \) 
29. \( \frac{x-3}{6^4} = \sqrt{6} \) 
30. \( 3^{2x} + 3^x - 2 = 0 \)

31. In 1990, the population of Africa was 643 million and by 2000 it had grown to 813 million.
   A. Find the exponential growth function that models the data.
   B. By which year will Africa’s population reach 2000 million (2 billion)?

32. Suppose you invest $7500 into an account that pays 3.5% interest each year, compounded quarterly. How long will it take for your investment to triple?

33. Suppose you invest $6000 into an account that pays 2% interest each year, compounded continuously. How long will it take for your investment to double?

For questions 34-35, find the inverse of each function.

34. \( f(x) = \frac{2+x}{5} \) 
35. \( f(x) = 6 - 2x^3 \)