Name: _____ **Date:** _____

Advanced Functions - Review for Unit # 4 Test WS

Answer each question or complete each problem. Show your work!!

1. Write the following inequalities in interval notation:
   a.) $-3 \le x < 5$ b.) IR , $x \ne -2, 0$ c.) $x \le -4$ or $x > 3$.
2. What are the NAMES and the EQUATIONS of the five basic parent functions?
3. What is the domain and range of the following function: $y = |x - 3| - 2$?
4. What is the domain and range of the following function: $y = \sqrt{x+4} + 1$?
5. What is the asymptote, domain, and range of $y = 3^{x+2} - 5$?
6. What is the asymptote, domain, and range of $y = \ln(x - 3) + 4$?
7. a.) Write the following in logarithmic form: $3^2 = 9$.
   b.) Write the following in exponential form: $\log_8\left(\frac{1}{512}\right) = -3$
8. Evaluate each expression:
   a.) $\log_5 625$ b.) $\log_4\left(\frac{1}{32}\right)$ c.) $\log_x 4 = \frac{1}{3}$
   d.) $e^{\ln 14 - \ln 2}$ e.) $\log_3 27 + \log_3 9$ f.) $\log\sqrt{1000}$
9. Solve the following exponential equations (round to 3 places):
   a.) $8^{2x+4} = 32$ c.) $4^{3x+5} = 3$
   b.) $6^{6-4x} = \frac{1}{36}$ d.) $6e^{4x-1} - 4 = 8$
10. Solve the following logarithmic equations (round to 3 places):
    a.) $\log_5(2x+4) - \log_5 3 = \log_5 10$ c.) $2\log_7(-9x - 8) - 1 = 5$
    b.) $\log_2 9 + 2\log_2 x = \log_2 144$ d.) $3 - 4\ln(x+6) = 7$
11. The following equations have something in common, find and explain what it is:
    a.) $81^{-2x-1} \bullet 9^x = 27^{1-2x}$ b.) $4 - 2^{3x+4} = 10$ c.) $\log_3(2x - 10) = \log_3(5x + 8)$
12. You bought an antique that appreciates by 6% each year you own it. The original value of the antique was $200. How much will the antique be worth after you've owed it for 8 years?
13. Francis took out a loan for $1,200 where the interest is compounded continously. After 5 years, Francis ended up paying $2,670 to pay off her loan. What was her interest rate?
14. Vinny bought a car in 2003 and wants to sell it in the current year of 2015. He knows that the car's price has decreased by 8% each year he has owned it. The car is now worth $10,479. What was the price of the car when Vinny initially bought it?
15. How many years will it take for someone to retain 54.5% of information presented to them?

16. George is investing $1500 into an account with a 7% interest rate.
    a.) How long will it take for the account to be $2,126 if the money is compounded monthly?
    b.) How long will it take for the account to triple if the money is compounded continuously?

17. Use the pH formula to find the following:
    a.) What is the pH of a liquid with a hydrogen ion concentration of 6.5×10^{-8} M?
    b.) What is the hydrogen ion concentration of a juice drink if its pH is 2.6?

18. Use the Decibel Scale Formula for the following:
    a.) A sound has an intensity level of 3.16×10^{3} Watts/meters squared, what is it intensity level in decibels?
    b.) A sound is measured to be 92 dB, what is it intensity level in Watts/meters squared?

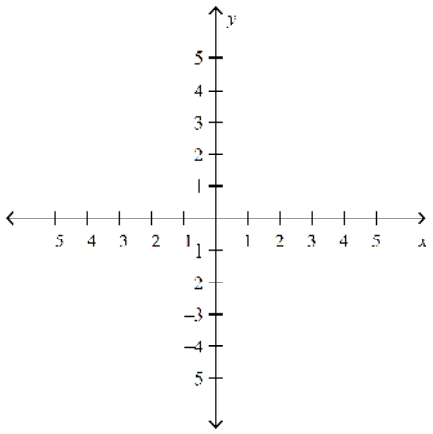
19. Determine if the following are power functions? If so, what are the values of k and p:
    a.) $f(x) = \sqrt{\frac{36}{x^{16}}}$ b.) $f(x) = 9 \bullet 5^{x}$

20. Write a power function in the form $y = k \bullet x^{p}$ that contains the points (13 , 12) and (1 , 10).

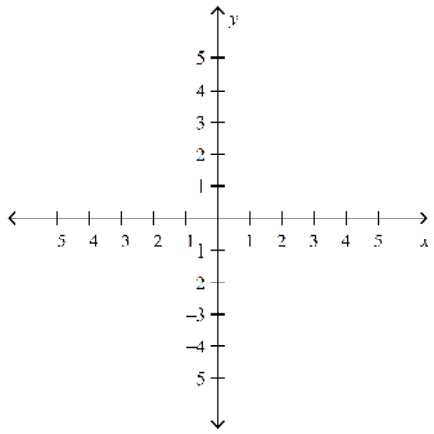
21. The temperature T of a given mass of gas varies inversely with its volume V. The temperature of 105 cubic centimeters of a certain gas is 30ºC. What will the volume of the gas if the temperature is 37.5ºC?

22. Graph and state domain/range for the following piecewise functions:

a.) $f(x) = \begin{cases} \frac{1}{2}x + 1 & \text{if} \quad x \le 0 \\ 4 - 2x & \text{if} \quad x > 0 \end{cases}$



b.) $f(x) = \begin{cases} -2 & \text{if} \quad x < -3 \\ 2x + 1 & \text{if} \quad -3 \le x \le -1 \\ 2\sqrt{x-1} + 1 & \text{if} \quad x \ge 1 \end{cases}$



23. The domestic postage rate for first class packages weighing x ounces is represented by the function below. How much will it cost to send a 6 oz and 9 oz letters together?

$$f(x) = \begin{cases} 0.34x + 4 & \text{if} \quad 0 < x \le 5 \\ 0.44x + 6 & \text{if} \quad 5 < x < 9 \\ 0.54x + 8 & \text{if} \quad x \ge 9 \end{cases}$$