Pre-Calculus
Chapter 1-6
1st Semester Final Review

Name _____
Date _____
Period _____

Work through these problems to help review for the final. If you want additional practice, go to MySchool and work on the chapter reviews. Additionally, review the chapter tests. Good luck and may the math be with you!! There will be approximately 25 multiple choice questions and two extended open answer questions. There will be a calculator and non-calculator portion of the test.

1. For the exponential function $f(x) = a \bullet b^x$, suppose $f(2) = 1$ and $f(5) = 8$. Find a and b and write the equation for the functions.

2. Use the equation in #1, find $f^{-1}(5000)$. Hint: find $f^{-1}(x)$ first.

3. Solve: $\log_4 x = 2.7$.

4. If $\frac{6x+3y}{y} = 8$, then what is the value of $\frac{x}{y}$?

5. Find the x and y intercepts of the circle, $(x+3)^2 + (y-2)^2 = 16$. Round answers to the thousandth place.

6. List the domain and range of $f(x) = 6 + (x-2)^{1/2}$.

7. Use $f(x)$ in #6, find $f^{-1}(x)$ and state the domain and range.

8. Find the solution for $\sqrt{6-x} - x = 6$. Check for extraneous solutions.

9. Solve: $(x-5)^2 = 45$

10. Solve: $\log_3(x+2) + \log_3(x-2) = 2$

11. Find the midpoint of $\overline{AB}$ if $A(1,3)$ and $B(7,1)$.

12. Use #11, what is the equation for the perpendicular bisector of $\overline{AB}$?

13. Write the equation for a line with a y-intercept of 3 and x-intercept of -5.

14. What is the domain of $\frac{1}{\sqrt{x-5}}$?

15. A quadratic has x-intercepts of 5 and -2, and a y-intercept of -20. What is the equation of the function?

16. Using #15, find $3 \bullet f(-x)$. What are the x and y intercepts? Round to the nearest thousandth place.

17. What is the value of a $100 investment after 20 years if the annual interest rate is 6.25% and it is compounded continuously.

18. If $P(x) = x^4 + 2x^3 - 2x^2 - 6x - 3 = 0$, find all four solutions real and/or complex.

19. For #18, list the interval(s) where $P(x) > 0$.

20. Find all real and imaginary roots to $x^3 - 4x^2 - 2x + 20 = 0$.

21. Solve: $-3(x-5)(x+3)(x+1) > 0$

22. One root of $P(x) = x^3 + 6x^2 + 3x - 10$ is $x = -2$. Find the other two roots.

For 23 and 24, suppose that an object is thrown into the air with an initial upward velocity of v_0 meters per second from a height h_0 meters above the ground. Then, t seconds later, its height $h(t)$ meters above the ground is modeled by the function $h(t) = -4.9t^2 + v_0 t + h_0$.

23. A ball is dropped out of a window of a tall building. If it hits the ground 3.5 seconds later, how high above the ground is the window?

24. A baseball is thrown with an upward velocity of 20 m/s from a balcony 20 m high.

    a. Find its height above the ground t seconds later.

    b. When will the ball be at its maximum height?

    c. When will the ball hit the ground?

25. Solve: $\log_5 x = \log_5 x + 3$

26. A gallon of milk cost $1.99 two years ago. Now it costs $2.19. What has been the annual rate of increase in cost?

27. A cubic polynomial has roots of 3, 5, and -3. If it has a y-intercept of 10, find the exact equation of this function.

28. Solve: $|2x - 6| \le 4$. Graph on a number line.

29. The half life of a radioactive substance is 2 days. If you start with 20g of the substance, how much remains after 5 days?

30. Graph: $\frac{(x-3)^2}{16} + \frac{(y+2)^2}{4} = 1$

31. Graph: $x^2 + 6x + y^2 - 8x = 11$