The following is the summer homework which will be due on the first day of school. You should take a week off at the beginning of the summer and then spend a few hours each week working on this packet. Do not expect to get it done or to be fully prepared for AP Calculus AB if you save the packet for the last minute. There will be a quiz in the first week of school which will cover the material in this packet.

Please show work for all problems on a separate sheet of paper. Be sure to write legibly, leave space between each problem, and box your answers.

I look forward to a great year!

Mrs. Compean

**AP Calculus Summer Review**

1. Evaluate the following without a calculator:
   
   a. \(2^{-3}\)  
   b. \(27^{-2/3}\)  
   c. \(16^{3/4}\)  
   d. \((4^2)^{(3/8)}\) (note: leave answer in terms of power of 2)

2. Find the distance between the points (-3, -1) and (-5, -4)

3. Find a complete graph of each of the following functions. Transfer your graph to paper and record the viewing rectangle and scale used:
   
   a. \(f(x) = 4 - x^2\)  
   b. \(f(x) = (x-1)^3 - 2\)  
   c. \(f(x) = -\frac{3}{2}x + 1\)  
   d. \(f(x) = \sqrt{x+3}\)  
   e. \(f(x) = |x| - 2\)  
   f. \(f(x) = |x-2|\)

4. Let \(f(x) = x^2 + 2\). Find \(f(0), f(-t), f(a), f(a + h), \) and \(\frac{f(a + h) - f(a)}{h}\).

5. Sketch the following without a calculator. Determine the domain and range of each:
   
   a. \(f(x) = \begin{cases} 2 - x, & x < -1 \\ (x-1)^2, & -1 \leq x < 2 \\ 2x - 3, & x \geq 2 \end{cases}\)
6. Determine a formula for the linear function, \( f(x) = mx + b \), that satisfies the conditions that \( f(2) = 0 \) and \( f(0) = 4 \).

7. Write an equation for the line with a slope of \( \frac{3}{4} \) that contains the point \((1, 2)\).

8. Write the equation for the vertical line through the point \((3, 7)\).

9. Find the midpoint and slope of the line segment determined by the two points \((2, -3)\) and \((-4, 6)\).

10. Determine \((f \circ g)(-3)\) if \( f(x) = 5x + 7 \) and \( g(x) = x^2 - 2 \).

11. Solve the equation \( x^2 - 4x - 21 = 0 \) by factoring.

12. Solve the equation \(|2 - 3x| = 7\).

13. Solve and graph (without a calculator) the following inequalities:
   a. \(|3x + 2| \leq 3\)
   b. \(|2x - 3| > 5\)

14. Solve \( x^2 + 3x - 8 = 0 \) using quadratic formula.

15. Determine whether the following function is one-to-one, and find an equation for the inverse relation of each function. Is the inverse a function? If so, find a function rule \( y = f^{-1}(x) \) for the inverse. \( f(x) = 2\sqrt{x - 4} \).

16. Determine all real-number zeros of the function: \( f(x) = x^3 + 3x^2 - 5x - 15 \) using algebraic methods.

17. Sketch a complete graph of the following functions without a calculator. Find all the vertical and horizontal asymptotes. State the domain and range.
   a) \( f(x) = \frac{7}{x + 5} \)
   b) \( f(x) = \frac{5x}{x - 3} \)
18. Solve the following equations or inequalities algebraically:

   \[ a) \frac{1}{x-3} + \frac{5}{x} = 2 \]

   \[ b) \frac{x-2}{x+5} \leq 0 \]

   \[ c) \frac{2}{x-3} + 6 \geq 0 \]

19. Solve each of the following algebraically:

   \[ a) \ 2(x-1)^{1/2} = 2 \]

   \[ b) \ \sqrt[3]{x^2 + 3x + 4} = 2 \]

20. Solve each of the following without using a calculator:

   \[ a) \ \log_5 125 = x \]

   \[ b) \ \log_3 (-9) = x \]

   \[ c) \ \log_5 (1/9) = -2 \]

   \[ d) \ \log_4 x = 3 \]

   \[ e) \ 5\log_3 x = 2 \]

   \[ f) \ \log_5 x + \log_5 (x-4) = 1 \]

   \[ g) \ 3\log_5 (x-1) - 2\log_5 4 = 0 \]

   \[ h) \ \log_2 (x-1) + \log_2 (x+2) = 2 \]