Disclaimer

You should use this practice exam to assess your speed and to improve your ability to correctly identify different problem types. The questions on this practice exam are taken from exams given in previous semesters, but they may not be representative of the questions that will appear on this semester's exam. You should also invest time re-reading the relevant parts of your textbook, reviewing your notes, and practicing homework problems.
You will not receive full credit if you do not clearly show work as demonstrated in class. Show all work in the space provided on this exam. Circle your answers.

1. Let \( f(x) = \begin{cases} \frac{2x+5}{x^2-3} & \text{if } -5 \leq x < 0 \\ x^2-3 & \text{if } 0 \leq x \leq 2 \end{cases} \) (16 points)

   a. Evaluate \( f(-2) \)  
   b. Evaluate \( f(0) \)  
   c. Evaluate \( f(2) \)  
   d. Evaluate \( f(-5) \)  
   e. Evaluate \( f(1) \)  
   f. Graph \( f(x) \) on the coordinate plane provided.
2. A line $l_1$ passes through the points: A(-2, 5) and B(4, -5).  

a. Write the equation of $l_1$ in slope-intercept form.

b. Find the equation of the line $l_2$ which is perpendicular to $l_1$ and has y-intercept: (0, 1).

c. Graph both lines on the coordinate plane.  
   *(Be sure to label each line.)*
3. Let \( y = \frac{3x}{x^2 - 9} \). (10 points)

   a. List the \( x \)-intercepts of the relation. If there are no \( x \)-intercepts then write \textit{no } \( x \)-\textit{intercepts}. 

   b. List the \( y \)-intercepts of the relation. If there are no \( y \)-intercepts then write \textit{no } \( y \)-\textit{intercepts}. 

   c. Test the relation for each of the symmetries listed below, then state your conclusions.

      \begin{align*}
      &x\text{-axis symmetry} & y\text{-axis symmetry} & \text{origin symmetry} \\
      \\
      \\
      \\
      \\
      \end{align*}
4. Use the graph of $f(x)$ shown below to determine the indicated characteristics. (20 points)

a. Determine the function’s domain.

b. Determine the function’s range.

c. Determine the intervals on which the function is increasing, if any.

d. Write the coordinates of the function’s $x$-intercepts, if any.

e. Determine the intervals on which the function is decreasing, if any.

f. Write the coordinates of the function’s $y$-intercept, if any.

g. Determine the intervals on which the function is constant, if any.
5. Given the graph of \( f(x) \) shown below, graph \( g(x) = f(x - 2) - 5 \).

Explain in words how the graph of \( g(x) \) is obtained from the graph of \( f(x) \).

6. Let \( f(x) = 2x^2 + 4 \).

   a. Find the average rate of change from 1 to 4.

   b. Find the equation of the secant line containing \((1, f(1))\) and \((4, f(4))\).

   c. Determine whether \( f(x) \) is even, odd, or neither.
7. Find the difference quotient of \( f(x) = x^2 + 3 \) that is find \( \frac{f(x + h) - f(x)}{h}, h \neq 0 \). (6 points)

Be sure to simplify your answer.

8. Sonia has $50,000 to invest. She plans to invest some of this money in noninsured bonds paying a simple interest rate of 15\% per year. The rest of the money will be invested in a government-insured certificate of deposit paying simple interest at an annual rate of 7\%. How much money should be invested in each account to produce $6,000 in interest each year? (10 points)