Solutions:

Math 1730 - Exam 1  
Fall 2002  

1. Define function: (5 pts) see text  

2. Given \( f(x) = 2x^5 - 7x^3 + 4x \), show that \( f \) is even, odd, or neither. (5 pts)  

   See example 1(b) on p. 153 of text  

3. Given \( f(x) = 3x^2 + 24x + 50 \), express \( f(x) \) in the form \( a(x - h)^2 + k \). (5 pts)  

   See example 2 on p. 170 of text.  

4. With respect to the function given in question 3.  

   a. Does \( f(x) \) have a minimum or a maximum? ("Yes" is not an appropriate solution) (2 pts)  

      \( f \) has a minimum  

   b. Where is the location of the minimum (or maximum) of \( f(x) \). (2 pts)  

      the minimum is located at the point \((-4, 2)\).  

   c. What is the minimum (or maximum) of \( f(x) \). (2 pts)  

      the minimum is -2.  

5. Given \( f(x) = \sqrt{x}, g(x) = x^2 - 3, \) and \( h(x) = 4x \)  

   a. Find \((f \circ g)(x)\). (2 pts)  

      \((f \circ g)(x) = \sqrt{x^2 - 3}\)  

   b. Give the domain of \((f \circ g)(x)\). (2 pts)  

      Domain: \((-\infty, -\sqrt{3}] \cup [\sqrt{3}, \infty)\)  

   c. Solve \((g + h)(x) = 0\). (Simplify as much as possible) (5 pts.)  

      Solve \(x^2 + 4x - 3 = 0\)  

      \(x = -2 \pm \sqrt{7}\).  

6. Given \( f(x) = \frac{1}{3x^2 - 2}, \)  

   a. Show that \( f \) is one-to-one. (5 pts)  

      Use the definition of one-to-one. Begin with "Suppose \( f(a) = f(b) \)" and work down to concluding that \( a = b \).  

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b. Find $f^{-1}(x)$. (5 pts)
   
   $f^{-1}(x) = (1 + 2x)/(3x)$.

Extra Credit:

The problem is worth 2 pts added to your Exam 1 test grade. No partial credit will be given. Please circle your answer.

Find the range of the function given by

$$f(x) = \begin{cases} 
-2x + 5 & x \leq -1 \\
x^2 & -1 < x < 1 \\
-2 & x \geq 1 
\end{cases}$$