MATH 260 **Solving Equations and Continuity** **Lab 3**

1. Consider the functions

$$f(x) = 1 - x + 4x^2 - 2x^3 \text{ and } g(x) = 6\cos(3x).$$

   (a) Find all the points where the functions intersect. If possible, give exact values. Any approximations should be to the nearest thousandth. State your solutions in a complete sentence.

   (b) Check your answers using the *eval* command.

2. Let $a(t) = t^4 - 2t^3 - t^2 + 3$ and $b(t) = 3t^3 + 5t^2 - 2t - 1$.

   (a) Solve $a(t) > b(t)$ using the context menu.

   (b) Solve $a(t) > b(t)$ using the solve command.

   (c) Write the solutions in standard interval notation. If possible, give exact values. Any approximations should be to the nearest thousandth.

   (d) Graph $a(t)$ and $b(t)$. Are the results reasonable based on the graph?

3. Find the roots of the function $f(x) = (x^2 + 3x - 4)\cos(x^2 + 3x - 5)$ on the interval $[0, 2]$. Give exact answers if possible. Any approximations should be to the nearest 0.0001.

4. The depth in feet of the water in a tide pool off the coast of Oregon is given by the function $D(t) = 3 + 2\cos\left(\frac{\pi}{6}t\right)$, where t represents time in hours after 6 am on Wednesday. Find the time periods when the water is at least 4 feet deep from 6am on Wednesday to 6am on Thursday. Give exact answers where possible, round any approximations to the nearest thousandths, and give your answer in interval notation.

5. Find all values where the function F is not continuous by using the *discont* command. Classify each discontinuity as infinite, jump, or removable.

$$F(x) = \frac{x^4 + 3x^3 - 3x^2 - 2x - 24}{x^4 - 4x^3 - 13x^2 + 62x - 56}$$

6. Consider the function $T(x) = \dfrac{x^2 - 5x + 6}{x^2 - 4}$.

   (a) Show that T has a removable discontinuity at $x = 2$.

   (b) Based on the results from part (a), a continuous function U can be defined where $U(x) = T(x)$ when $x \neq 2$, but $U(x)$ is defined and continuous at 2. Define the function U.

   (c) Test U for continuity using the *iscont* command.