Factoring Expressions and Solving Equations

1. At the prompt, type the following commands and press Enter:
   clear
   syms x
   expr1 = (x-1)*(x-2)*(x-3)*(x-4)*(x-5)
   expr2 = expand(expr1)
   factor(expr2)
   solve(expr2) .............................This solves the equation $expr2 = 0$
   Explain what happened. What is the relationship between solving and factoring?

2. Type and enter:
   expr3 = $x^4 + 3x^3 + 3x^2 + x + 3$
   factor(expr3)
   solve(expr3)
   double(ans)
   Explain what happened. Explain why an exact, symbolic solution may not be as useful as an approximation.

3. Try to solve $expr3 - 3$ by typing the following commands:
   factor(expr3 - 3)
   solve(expr3 - 3)
   double(ans)
   Why is the answer so nice?

4. Make $expr4$ be equal to $expr1 + 1$ by typing: $expr4 = expr1 + 1$
   Try to factor $expr4$ by typing: factor(expr4)
   And to solve $expr4 = 0$ by typing: solve(expr4)
   Why do you think MATLAB produces a numerical solution (for solve), rather than symbolic? Hint: Is it possible in this case to give a symbolic solution? Why?

5. Prepare a brief (< 1 page) written report answering all the questions. Use complete sentences and standard mathematical notation. Do not get a printout.

The user learns basic algebraic manipulation commands and is led to consider the difference between numerical and symbolic solving techniques. The user must confront the foundational fact that a symbolic solution is not always possible.

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