

Factoring Expressions and Solving Equations¹

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 + 3*x^3 + 3*x^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.

¹Copyright ©2002, Larry Snyder and Todd Young. All rights reserved. Please address comments to young@math.ohiou.edu.