MAT331 Exercises, Spring 08

set number 1

NOTE: *Each exercise is worth 10 points and can be turned in at any time before its "expiration date". Altogether, these will count the same as one project.*

Many of these problems will require you to use the help system and/or read the text to figure out what commands you need to use and how to use them. Figure out what to do is part of the work.

1. *(expires 9/12) Use* `Maple` *to write* $x^5 - 2x^4 - 10x^3 + 20x^2 - 16x + 32$ *as a product of* exact *linear factors. By exact, I mean you should leave any non-rational factors expressed as radicals; do not approximate terms like* $\sqrt{3}$ *as 1.73205, etc.*

2. *(expires 9/12) EXTRA CREDIT Draw a graph showing both* $\cos(x)$ *and its fifth Taylor polynomial (that is,* $1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4$ *) for* x *between* -4 *and* 4*. What degree of Taylor polynomial seems to be needed to get good agreement in this range?* Hint: use a variation of the command `convert(taylor(cos(x),x,5),polynom)` to make this work. Think of a suitable way to demonstrate that the approximation you have taken is "good"– what is a good definition of "good" here?

3. *(expires 9/12) Consider the planar curve* γ *defined by* $x^2y^3 + y^2 + y - 2e^x = 0$*. Using* ***only*** `Maple`*, find the slope of the tangent line to the curve at* $(0, 1)$*. Then plot the curve and the tangent line on the same graph.*
   Hint: you might want to use `implicitplot` from the library `plots`. You might find `implicitdiff` helpful, too.

4. *(expires 9/12) Plot the function* $f(x) = 2\sin x - x^3 - 1/5$*, for* $x \in [-4, 4]$*. Find all the zeros of the function with an accuracy of 20 decimal digits.* Hint: See `Digits`, `fsolve`.