

18.034, Honors Differential Equations
Prof. Jason Starr
Lecture 13
3/3/04

1. Brief discussion of \mathbb{C} cpx multiplication, complex conjugation and why inverses exist.
2. Stated the Fundamental Theorem of Algebra and showed for polynomials of degree 2, it is just the quadratic fn.
3. Brief discussion of cpx-valued functions of a real variable -- same as \mathbb{R}^2 -valued functions, but have extra operations of conjugation and cpx. multiplication.
4. Defined cpx exponentials: $e^{\alpha+i\beta} = e^\alpha \cos(\beta) + ie^\alpha \sin(\beta)$.
Discussed the properties including (i) polar coords. description of cpx exponential (and also of cpx. Mult.)
 - (ii) $e^0 = 1$
 - (iii) $e^{z_1+z_2} = e^{z_1} \cdot e^{z_2}$
 - (iv) $\frac{d}{dt} e^{\lambda t} = \lambda \cdot e^{\lambda t} \leftarrow$ main property.
5. At this point we ran out of time, so I just ptd. out that (iv) implies the "exponential shift rule" also holds for complex exponentials.