Topics in Mathematical Physics (PHYS 320): 9 Spring 2019

Reading: For a quick intro to Hermite polynominals (which are coming up...) see Boas Chapter 12 section 22.
You may wish to skim Boas Chapter 1 on the convergence of series so you can recall some of the issues in play and read Boas sections 2.6 and 2.7 on convergence in the complex plane.

(1) Use the series method to obtain the series solution to the initial value problem

$$u'' + 9u = 0 \text{ with } u(0) = 1 \text{ and } u'(0) = 0$$

Name that function!

(2) In our solution of the Schödinger's equation for the harmonic oscillator we will see that the ratio of the b_n's, in the limit of large n, scale as

$$\frac{b_{n+2}}{b_n} \simeq \frac{2}{n}.$$

Show that this is the same behavior as e^{x^2}.
Hint: Expand the exponential function in the series and show that it has the same behavior.