- Introduction, advice, pep talk.

- Tour of Chapter9.nb and Mathematica.

- Play around with various math identities, series expansions, etc.

- Examples $2682440^4 + 15365639^4 + 18796760^4 = 20615673^4$. $\sin(\pi/5) =$, $5e^{i6} =$, show $\tan(3\pi/11) + 4\sin(2\pi/11) = \sqrt{11}$ using Simplify and FullSimplify. FactorInteger[]. Expand[] and Factor[] examples.

- $y = x + 2$ vs $y := x + 2$, change x and see what happens for y.

- Just for fun: Manipulate[Expand[$(1+x)^n$], $\{n, 1, 10, 1\}$]. Also, $f[x_] := (1+x)^{-1}$ and Simplify[$f[f[f[f[x]]]]$].

- Table[$x_i, \{i, 1, 10\}$], Table[$x^i + y^i, \{i, 2, 17, 2\}$], $Table[n^2 + n + 41, \{n, 0, 40\}]$ and then PrimeQ[%].

- Example: $Mx = b$ where M is a matrix given by the class and b is a column vector. Use some complex numbers for fun.

- Example: suppose that $H = A\mathbf{1}_2 + B\sigma_1$, where A and B are some given constants, and $\mathbf{1} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ and $\sigma_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ (you will often see two-by-two Hermitian traceless matrices, and the standard basis is the three Pauli matrices). Find all solutions of $H\psi = E\psi$, where ψ is a two component vector.

- Example: pendulum.

Ended here

- Example: waves on a string.

- Example: Electric field wave equation in vacuum.

- Example: forced SHO.