Guide to calculating neuron properties:

1. Resting membrane potential (V\_rest):
   1. With no current injected, find the steady state voltage value for the cell (typically ~-70)
2. Time constant
   1. Inject a small current into the cell (Ex: 60 nA)
   2. Determine the cell’s resting membrane potential at the time right before current injection
   3. Inject the current for a duration long enough for the cell to become stable (flatline)
   4. Calculate 63.2% of the difference in mV change
   5. Find the time at which that value (mV) occurs
   6. Subtract the start time from the found time, this is your time constant
3. Input resistance
   1. Taking the values used in finding the time constant
   2. Calculate delta\_V/delta\_I or (start membrane potential – end membrane potential)/(start current inject value – end current inject value)
   3. Keep value magnitude in mind

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| Example:  **1. V\_rest = \_70\_ mV**  **2. Calculation of time constant:**  Start inject: 100ms / -65mV Final Value: ~ -74.81mV Difference: -4.81 ms | 63.2% = 3.04 mV| -70 - 3.04 =  - 73.04 Time at - 73.04: 116.3ms τ = 116.3-100  **τ = 16.3 ms**  **3. Input Resistance**  ΔV/ΔI = ( -70 – (-74.8) )/( 0 – (-60) )  = 4.81mV / 60pA   = .00481 V/.00000000006 A = 80166666.667 Ω **R\_in = 80.67 MΩ** |

Calculating the FI curve:

For increasing levels of current injection plot current injected on the X axis with cell spike frequency (Hz) [spikes per second] on the Y axis.

