30 ***Communication***
4 Work recorded in notebook (rather than pasted in)
8 Complete information: task descriptions, diagrams, data, reproducible one year later
4 Written in Ink
4 Student Signed every page
4 Student Dated every page
6 TA Signature for every lab session (-3 each session missed)

Lab 1.a

2 IV. CONSTRUCTION OF LED POWER INDICATORS
1 Explanation of task (built power indicators)
1 Diagram of circuit from Fig. 3

8 V. RESISTOR AND LED CURRENTS
A. *Measurements of Voltages*
1 Explanation of task (measured voltages for R and LED)
1 Table II filled in with measured values
B. *Calculation of Current in Resistor and LED*
1 Explanation of task (Used Ohm's law to calculate $i_R = i_{\text{LED}}$)
1 Table III filled in with measured values
C. *Plot of Current versus Voltage in LED*
1 Explanation of task (Commented on plot of LED current versus voltage)
3 Drew accurate plot of LED current vs voltage with all labels

5 VI. CONSTRUCTION AND TESTING OF PRE-AMPS
A. *Construction*
1 Explanation of task (constructed pre-amps circuits on breadboard)
1 Schematic of pre-amps
1 Explanation of testing (1 V 1 kHz sinusoid in, oscilloscope measure output)
B. *Drawing of Waveforms*
2 Careful drawing of oscilloscope screen

Lab 1.b

6 V. DEMONSTRATING THE NEED FOR PRE-AMPS
B. *Procedure*
1 Explanation of task (measured voltages for electrode model v-divider)
2 Table II-A filled in with measured values
1 Explanation of task (measured voltages for pre-amp model v-divider)
2 Table II-B filled in with measured values

18 VI. DERIVING AN EXPRESSION FOR THE DIFFERENTIAL AMPLIFIER OUTPUT
A. *Deriving the Expression for v_3*
1 Explanation of task (deriving expression for output of diff-amp)
1 Schematic of differential-amp
12 Derivations: v_+, v_-, and v_3
B. *Differential Gain*
4 Derivation of v_3 in terms of $\Re$

21 VII. DESIGNING, BUILDING, AND TESTING THE DIFFERENTIAL AMPLIFIER

A. *Resistor values for a gain of 500*

3 Explanation of how R_1, R_2, R_3, and R_4 chosen

2 List of values for R_1, R_2, R_3, and R_4

B. *Building and Testing the Differential Amplifier*

1 Schematic (for circuit in Fig. 6 or for own circuit layout)

1 Explanation of test procedure including 6 V power supply and v-divider

3 Table of values of measured diff-amp output vs input 1 voltage

3 Table of values of measured diff-amp output vs input 2 voltage

C. *Measuring the Gain of the Differential Amplifier*

3 Plot of v_3 vs $v_2 - v_1$

3 `polyfit()` straight line fit of data

2 Calculation of gain of differential amplifier

10 VIII. MEASURING AND ANALYZING EMG'S

A. *Measuring EMG's*

1 Explanation of task (used electrodes on biceps to measure EMG)

4 Printout of EMG waveform on oscilloscope

B. *Power versus Weight for EMG signals*

1 Explanation of task (Matlab® calculation of power in EMG waveform)

C. *Plot of EMG Power versus Weight*

4 Matlab® plot of power vs weight