Lab #1: Team
Statistics / Sensors / Plethysmography
Due: Start of NEXT lab session (1 week)

Name(s): ___________________________________________ Team #: _______

Statistics & Sensors (3 Marks)

A) Clean your stethoscope. Experiment with your stethoscope to answer the following questions. Circle the correct answer.

1. The heartbeat is most easily heard on the [chest back].
2. Breathing sounds are most easily heard on the [chest back].
3. Breathing is louder when the patient [inhales exhales].
4. A louder sound is heard with the [diaphragm bell].
5. The amplitude using the [diaphragm bell] is more sensitive to applied pressure.
6. Indicate on the figure where the heartbeat is most easily heard.

B) Breathe into the ETCO$_2$ monitor. Note the following:
   • “ETCO$_2$” = Waveform
   • “RR” = Respiration Rate
1. ETCO$_2$ is a(n) [direct indirect] sensing method.
2. ETCO$_2$ is a [continuous sampled] sensing method.
3. ETCO$_2$ is a [delayed-time real-time] sensing method.
4. ETCO$_2$ [increases decreases] when you breathe faster.
5. RR is a(n) [direct indirect] sensing method.
6. RR is a [continuous sampled] sensing method.
7. RR is a [delayed-time real-time] sensing method.

C) Jog on the treadmill for 1 minute. Immediately after stopping, breathe into the ETCO$_2$ monitor and record RR at 5 second intervals. Collect 15 data points. Wait 5 minutes and repeat the test to collect a second set of 15 data points.

1. Compute the mean.
2. Compute the median.
3. Compute the RMS.
4. Compute the standard deviation.
5. Compute the coefficient of variation.
6. Plot RR vs Time using Matlab and compute linearity.

D) Breathe as fast as you can while filling and emptying your lungs at least 50%.
   1. Record your maximum respiration rate.
   2. Compute the repeatability of the 2 mean values computed above. Use your maximum respiration rate as the operating range value.

**Limb Plethysmography (2 Marks)**

A) Extend your arm and completely and relax it. Measure the diameter of the upper arm (around the bicep).

B) Put a sphygmomanometer around the arm.
   1. Pump the sphygmomanometer to 40 mmHg.
   2. **Measure the outer diameter of the sphygmomanometer.**
   3. Assume the inner diameter did not change from Part A.
   4. Bend your elbow 90° and rotate your wrist 90°.
   5. **Record the pressure and compute % change in arm volume from wrist rotation.**
   6. Increase the sphygmomanometer pressure to 40 mmHg. The needle will jump with the pulse.
   7. **Record the pressure and compute % change in arm volume from your pulse.**

**Deliverables:**
- This lab sheet with your other work attached.