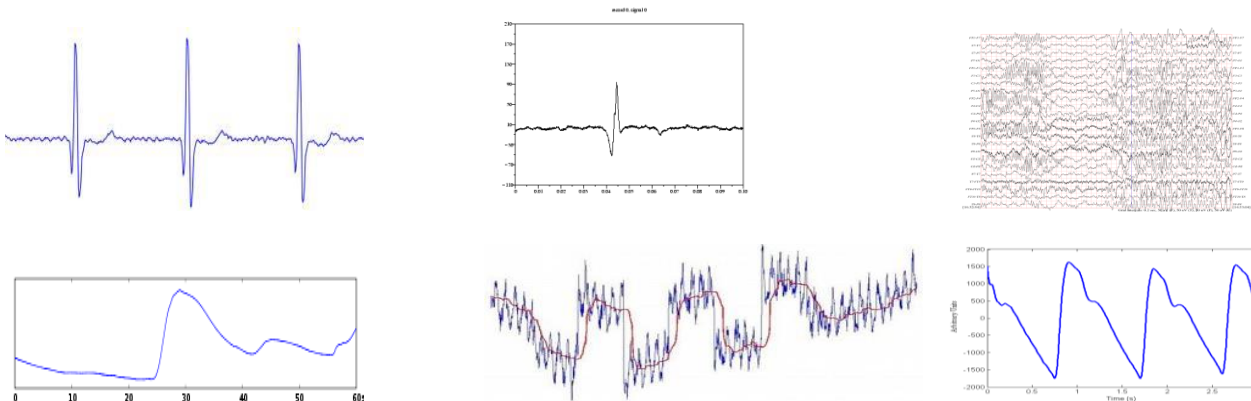


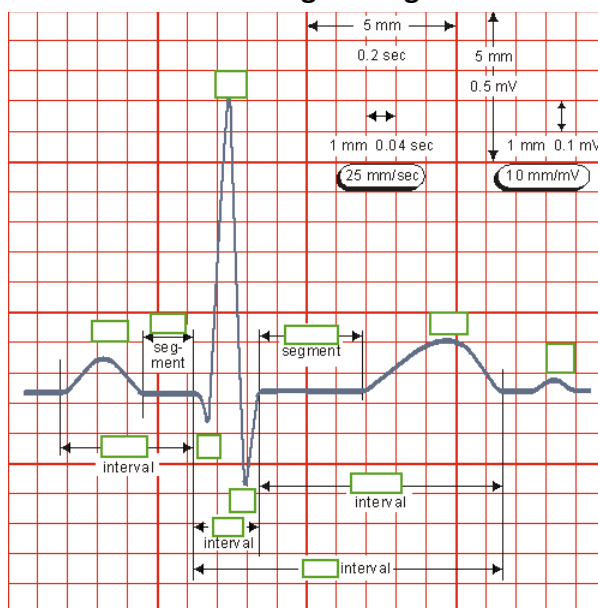
Entrance Test – 18.2.2014

Name: _____

1. Identify the following biological signals (PPG, EEG, EOG, EMG, ECG, GSR) and give their full names



2. Annotate the following ECG signal: name the waves, intervals and segments



3. Match the problem with possible algorithms for the solution

ECG baseline wandering removal
ECG Denoising
Event-related potentials in EEG
Detection of QRS complex

Wavelet transform and singularity detection
Bayesian filtering
Derivative based algorithm
Over-fitting using wavelet approximation
Adapted wavelet filtering
Step-wise discriminant analysis
Suitable approximation of the baseline

4. Name the four basic groups of waves in a normal EEG and their frequency range

5. Answer True or False to the following questions

- It is valid to directly compare the EMG output (e.g., integral) of a muscle across subjects.
- An EMG signal will not necessarily reflect the total amount of force (or torque) a muscle can generate.
- EMG potentials usually range between 50 μ V and 30 mV.

6. Match each signal with standard applications

GSR
PPG
EOG

Monitoring of heart and respiratory rates
Eye movement measurements
Measuring blood pressure
Emotional arousal
electrical conductance of the skin
Assessment of cardiac output

7. Name the four nucleotides present in human deoxyribonucleic acid

8. Mark the following sequences as a protein, DNA or RNA sequence

QERLDCHGFAFFGWDWWNGPRAVKSTQIIITRKWFDITNNKDEDTNKSGYKDLVSICQTG
ACAAGATGCCATTGTCCCGGCCTCCTGCTGCTGCTGCTCTCCGGGGCCACGGGCTCTGAA
AACUUCUUCUGGAAGACCUUCUCCUCCUGCAAAUAAAACCUCACCCAUGAAUGCUCACGC

9. Shortly define the following terms

Sampling frequency:

LTI system:

Heart rate variability:

Low-pass filter:

10. Write a simple Matlab function that calculates the heart rate from a PPG signal