Recruitment Challenge

As a recruitment challenge, you have to write three Python functions performing processing and analysis of ECG signal stored in a file „`data.mat`". The signal is sampled 360 times per second.

1. **Design a band-pass filter** with following parameters:
   - Lower cutoff frequency: 8 Hz
   - Upper cutoff frequency: 40 Hz
   - Sampling frequency: 360 Hz

   Select a proper filter length. Once you complete design, apply filter on ECG signal. Input and output of the function is specified in **`filter_ecg()`** function template.

2. **Find R-peaks** (R-waves) in ECG signal. Try to be as flexible as possible in order to make your function work with different signal amplitudes or sampling rates. Input and output of the function is specified in **`find_r_peaks()`** function template.

3. Transform ECG signal to frequency domain and **calculate a percentage of energy in band 0-15Hz**. In other words, calculate a ratio between spectrum energy in band 0-15Hz and total spectrum energy.

$$\frac{E_{(0-15Hz)}}{E_{total}} \cdot 100\%$$

   Input and output of the function is specified in **`calc_freq_content()`** function template.

Use attached file „`main.py`". All you need to do is to fill functions bodies and import required packages.

Good luck!