4. A duet consisting of a violinist and a pianist is playing in a small concert hall. The length of the concert hall is 28 meters, width is 11 meters and height is 5 meters. The absorption coefficient of the floor is 0.1 and the absorption coefficient of all other surfaces is 0.3. There are 100 people in the crowd. The sound pressure level of the violinist is 86 dB when measured at the distance of 1 meter in free field and the sound pressure level of the pianist is 88 dB. You can assume that the piano and the violin are omnidirectional. You are in the crowd so that the distance to the violinist is 4 meters and the distance to the pianist is 6 meters. Compute the sound pressure level at your position in the concert hall.

5. Inspired by their concert, you decide to purchase every album by the band from an Internet music store (6 albums, 74 songs, 5 h 29 min 01 s).
   (a) How long does it take to download the MPEG-2 AAC 128 kbit/s encoded files when your "broadband" Internet connection is a 256 kbit/s ADSL modem? The practical transfer rate, however, is only 80 % of the maximum.
   (b) You have a music player included in your mobile phone but, unfortunately, it does not support the AAC format. Therefore, you have to transcode the files into 160 kbit/s MP3 format. Prove by calculation can you fit all the files into the 256 MB memory card of the phone.
   (c) How much space would the files need if they were in CD quality without any compression?

   (Note that, unlike with transfer rates, with storage capacities the "kilos" and "megas" refer to coefficients based on powers of 2, not standardized SI coefficients)

6. Answer the following questions (a)-(f) by selecting the best alternative (A, B, C, D, E, or F). An adequate answer is the correct sequence of letters, that is, 6 capital letters in the right order. Note! Verify that you have chosen the alternative you want.
   (a) The frequency of the note A is 440 Hz. What is the frequency of one semitone higher note when using equal temperament?
   (A) 449 Hz (B) 454 Hz (C) 466 Hz (D) 477 Hz (E) 523 Hz (F) 880 Hz
   (b) When storing a sound signal with 24 bits (using linear quantization), the dynamics is
   (A) 24 dB (B) 69 dB (C) 96 dB (D) 108 dB (E) 124 dB (F) 144 dB
   (c) The frequency of a sound is 2 kHz. What is the wavelength in the air, the temperature is 20°C?
   (A) 12 mm (B) 17 cm (C) 1 m (D) 5,8 m (E) 6,4 m (F) 20 m
   (d) If the sound pressure level of one speaker is 60 dB at 1 m distance, what is the sound pressure level of 6 speakers at 6 meter distance?
   (A) 52 dB (B) 54 dB (C) 60 dB (D) 66 dB (E) 68 dB (F) 96 dB
   (e) When directivity of a sound source Q = 1 and absorption area of a room A = 10 m^2, the reverberation radius is
   (A) 0,4460 m (B) 1,0 m (C) 1,343 m (D) 3,43 m (E) 5,0 m (F) 10,0 m
   (f) How many hours equals 90 dB L_{eq}, when it is 8 hours for 85 dB?
   (A) 0,5 h (B) 1 h (C) 1,5 h (D) 2,5 h (E) 5 h (F) 9 h