CSCI576 Assignment1

Question1：
- 1.75, 2.25, 2.25, 3.25, 3.25, 3.25, 2.50, 2.75, 2.75, 2.75, 1.50, 1.00, 1.25, 1.25, 1.75, 2.25, 2.25, 2.25, 2.00, 2.25, 1.25, 0.25, -1.25, -1.25, -1.75, -1.00, -2.25, -1.50, -1.50, -0.75, 0.00, 1.00

- 32 samples * 5 bits/sample = 160 bits

Question2:
- The second optional feature is off:
  YUV 4:2:0 color subsampling scheme : (4 * 12 +12 + 12) / 4 = 18 bits/pixel
  Minimal Compression Ratio = Uncompressed Size/Compressed Size = (1080 * 1920 pixels/frame * 24 frames/second * 18bits / pixel) / 36Mbytes = 895795200 bits / 301989888 bits = 2.966
  Minimal Compression Ratio = 2.966

- The second optional feature is on:
  Uncompressed Size/Compressed Size = (352 * 288 pixels/frame * 24 frames/second * 18bits / pixel) / 36Mbytes = 0.145 < 1
  Minimal Compression Ratio = 1 because uncompressed size is smaller than the biggest compressed size.

- 352 : 288 = 11 : 9
  1920 : 1080 = 16 : 9
  Pixel Aspect Ratio = (11/16) / (9/9) = 0.6875
  The pixel aspect ratio will change from 1 to 0.6875.

Question3:
- (36 km/hr) / (3.14 * 0.4244 m/rotation) = 7.5 rotations/sec
  7.5 rotations/sec * 2 = 15 < 24 fps
  The rate of tire rotation perceived is to be 7.5 rotations/sec.

- 7.5 rotations/sec *2 = 15 > 8 fps
  (7.5 rotations/sec) / (8 fps) = 15/16 rotations/frame => 1/16 rotation/frame backward.
  1/16 rotation/frame * 8 fps = 0.5 rotations/sec backward.
  In my video recording, the tire rotates backward at the rate of 0.5 rotations/sec.

- 24 fps / 2 = 12 rotations
  Perimeter = (180 km/hr) / (12 rotations/sec) = 4.167 m
  Diameter = 4.167m / 3.1416 = 1.33m
  If no temporal aliasing is witnessed, the tire's diameter must be more than 1.33m.