Quiz 4

TOTAL POINTS 15

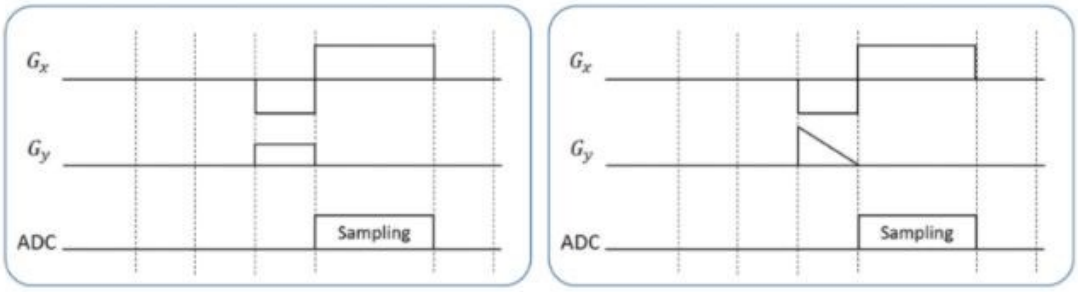
1. Which of the followings is not appropriate for imaging a thinner slice? 1 point

- ○ Narrower RF bandwidth
- ◉ Higher transmission frequency
- ○ Stronger gradient
- ○ Longer RF duration

2. Frequency encoding gradient along x-axis enables to discriminate the objects in different x positions because they had different precession frequencies along x-axis. 1 point

- ◉ True
- ○ False

3. The following two pulse sequences have the same area of phase encoding gradients. The echoes from these sequences are different because the gradient waveforms are different from each other. 1 point



- ○ True
- ◉ False

4. Which statement about K-space is not correct? 1 point

- ○ K-space is a domain determined as 2D Fourier transform of the MR image.
- ○ A K-space region to be converted to an MR image can be completely filled by frequency encoding and phase encoding.
- ◉ Objects at a certain spatial location contribute to signals at the corresponding K-space location.
- ○ The K-space position of a sampled data point is determined by the temporal integration area of gradient pulses.

5. Which statement is correct? 1 point

- ○ MR signal cannot be acquired without gradient pulses.
- ◉ MR signal can be acquired with RF pulse and data sampling.
- ○ The free induction decay signal can be converted to the object MR image without gradient pulses.
- ○ MR image with spatial information can be acquired without gradient pulses.

6. Which is the correct statement regarding slice selection? 1 point

- ◉ Slice refocusing gradient makes the magnetization in the selected slice to be in phase.
- ○ Slice selection always occurs along the z-axis.
- ○ RF bandwidth is typically adjusted during MRI scanning.
- ○ Transmission frequency of RF pulse determines slice thickness.

7. You want to image a slice that is 5cm off-center along z-axis. When the strength of the slice selection gradient is 0.2 G/cm, what is the difference between the transmission frequencies for excitation of the 5cm off-center and the isocenter (0cm off-center)? 1 point

(Hint : $\hat{\gamma}=\gamma/2\pi$ = 42.58MHz/T = 4258 Hz/G)

- ○ 851.6 Hz
- ○ 0 Hz
- ◉ 4258 Hz
- ○ 21290 Hz

8. You want to image a slice with 1-cm thickness. When the RF bandwidth is 1kHz, what should be strength of the slice selection gradient? 1 point

(Hint : $\hat{\gamma}=\gamma/2\pi$ = 42.58MHz/T = 4258 Hz/G)

- ◉ 0.4258 G/cm
- ○ 2.35 G/cm
- ○ 4.258 G/cm
- ○ 0.235 G/cm

9. Slice selection should always be performed by applying an RF pulse in the existence of a slice selection gradient. 1 point

- (●) True
- ( ) False

10. After slice selection, a frequency encoding gradient and a phase encoding gradient are applied with 0.5 G/cm for 1ms and -0.2G/cm for 0.5ms, respectively, before sampling a data point. What is kx and ky? Assume both gradients are rectangular pulses. 1 point

- ( ) -2.129 cm^{-1}, 0.851 cm^{-1}
- ( ) 8.516 cm^{-1}, -4.258 cm^{-1}
- ( ) 2.129 cm^{-1}, -0.426 cm^{-1}
- (●) 2.129 cm^{-1}, -0.851 cm^{-1}

11. The center 10 lines of the k-space are from the center 10 lines of the corresponding MR image. 1 point

- ( ) True
- (●) False

12. Which statement is not correct about slice refocusing gradient and readout prephase gradient? 1 point

- (●) The acquisition of desired K-space region has nothing to do with the readout prephase gradient.
- ( ) The slice refocusing gradient is applied to make the spins within the excited slice inphase.
- ( ) The readout prephase gradient is applied to make the transverse magnetization dephase before data sampling.
- ( ) If the excitation RF pulse is not symmetric in time, temporal integration of the slice refocusing gradient may not be half the temporal integration area of the slice selection gradient.