1) FOV: 1.2 × 1.2 × 3 cm 256 × 256 matrix nBW = 750 Hz/pixel
$B_0 = 1.5\,T$ $g_{max} = 25\ mT/m$ $\dot{G}_{max} = 180\ T/m/s$

a) $TBW = \tau = 1ms \cdot \Delta f$ $\gamma = \frac{\gamma}{2\pi}$

$\Delta f = \frac{2}{1ms}$ $\Delta z = 3mm$

$\Delta f = \gamma G \cdot \Delta z$ $G = \frac{\Delta f}{\gamma \Delta z} = \frac{2000\,Hz}{T \cdot 42.58\,\frac{MHz}{T} \cdot 3mm} = 15.66\,\frac{mT}{m}$

b) $G = slewrate \cdot t_{ramp} =$

$t_{ramp} = \frac{G_{ss}}{slewrate} = \frac{15.66\ mT/m}{180\ T/m/s} = 0.087\ ms$ t_{ramp}

$T_{tot} = 2\,t_{ramp} + t_{ss} =$ **1.174 ms = T_{tot}** **$G_{ss} = 15.66\,\frac{mT}{m}$**

b) $K_y = \gamma G_{PE} T_{PE}$ $K_y = \frac{1}{1.2}$

$t_{ramp} = \frac{25\ mT/m}{180} = 0.139\ ms$ $2 t_{ramp} = 0.278\ ms$

$K_{y\,ramp} = \gamma G_{max} T_{ramp} \Rightarrow K_{y\,ramp} = 42.58\,\frac{}{2\pi} \cdot 25 \cdot 0.139 = 235.49$

$t_{top} = \frac{K_{top}}{\gamma G_{max}} = \frac{K_{max} - K_{ramp}}{\gamma G_{max}} = \frac{K_{max}}{\gamma G_{max}} - \frac{\gamma G_{max} t_{rise}}{\gamma G_{max}}$

$= \frac{1}{2.4\,cm \cdot 42.58 \cdot 25} - 0.139\,ms = 0.252$

$t_{pe} = 0.530\ ms$

c) $\Delta f = \gamma G\, FOV$

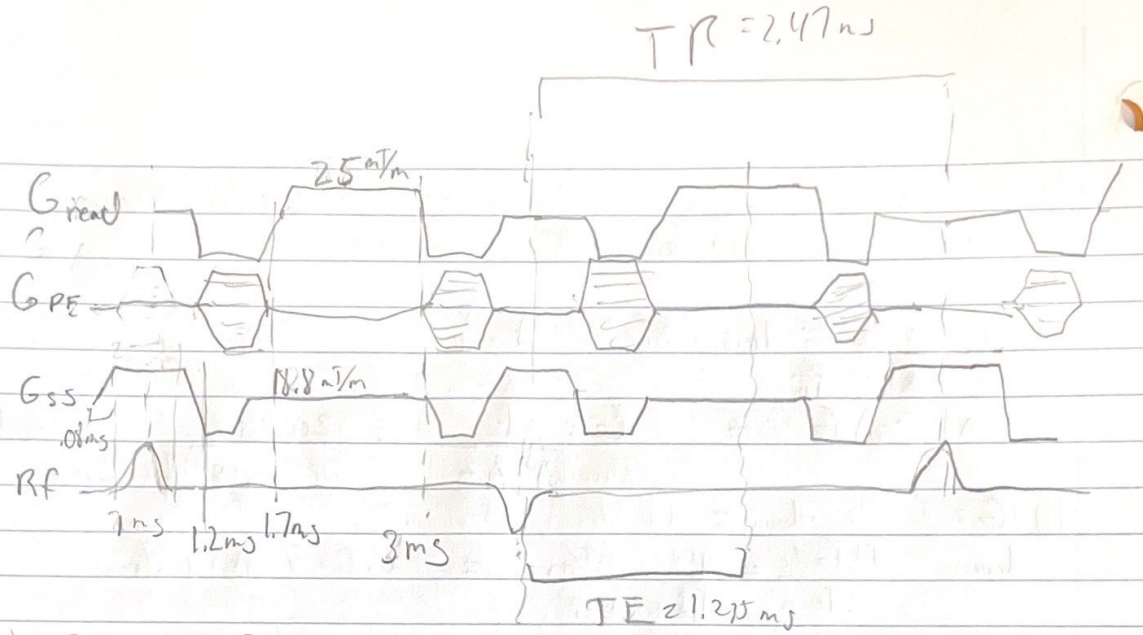
$2 \cdot 750\,Hz = 42.58\,\frac{MHz}{T} G\,(256 \cdot 1.2)\,mm$ **$G = 14.68\,\frac{mT}{m}$**

$t_{rise} = \frac{14.68\,mT/m}{180\ T/m/s} = 0.0815\ ms$

$t_s = \frac{1}{750} \Rightarrow$ **$T_{1/2} = 1.3\ ms$**

d) $TR = T_{ss} + T_f = 1.174 + 1.3 = 2.47\ ms$

$TE = TR/2 = 1.235\ ms$



e) Increase Recrue bandwith
Increase Maximum gradie
Increase Slew rate

3.3.2) The rf pulse and its Fourie transform for 90° both have a higher amplitude than the 60° pulse,

3.3.3) T_2 = 2ms degreases the amplitude of the slice profile

3.4) The slice rephasing gradient brings us back to the center of K-space so that the phase and frequency are equal constant gradient across the slice. Otherwise phase wrapping and artifacts would appear