1. Two planes are separated by 500 m. If your RADAR has a pulse width of 1 µs, can you see both planes?

$\Delta R =$ ☐

2. Two planes are separated by 500 m. If your RADAR has a pulse width of 10 µs, can you see both planes?

$\Delta R =$ ☐

3. A RADAR that has a PRF of 10kHz is trying to detect an object 25 km away. Will it be able to unambiguously detect the range?

$R_{unamb} =$ ☐

4. An aircraft is approaching a RADAR using an approach angle of 20°. The aircraft is traveling at a speed of 200 mph. The RADAR emits its signal at a frequency of 200 MHz. What is the frequency of the return signal?

$f =$ ☐

5. An airplane is flying overhead with an approach angle of 60°. If a RADAR transmits a signal at 300 MHz and it returns at 300.000125 MHz, how fast is the airplane traveling?

$v =$ ☐

6. A squadron of planes is approaching a SAM site's RADAR installation. The RADAR has a PRF of 6 kHz and a pulse width of 300 ns.

   (a) What is the PRI?

   $PRI =$ ☐

   (b) If you are 28 km from the SAM site, does it know where you are (without additional processing)?

   $R_{unamb} =$ ☐

   (c) If you are ingressing as a two-ship with 10 m spacing, will the SAM be able to tell there are two of you?

   $\Delta R =$ ☐

7. A squadron of planes is approaching a RADAR installation. The squadron has the following characteristics:

   $\sigma = 6\text{m}^2$
   $\text{G}_\text{R} = 3.2$
   $\text{P}_{\text{r,min, RWR}} = 2\mu\text{W}$
   altitude = 1000ft, AGL

   The RADAR installation has the following characteristics:

   $f = 1\text{GHz}$
   $\text{G}_\text{T} = 300$
   $\text{P}_\text{T} = 400\text{kW}$
   $\text{P}_{\text{r,min,RADAR}} = 300\text{fW}$
   altitude = 300ft, AGL

   (a) For the RADAR installation, what is the PRF required to unambiguously detect the squadron (consider the lead aircraft) out to 180km?

   PRF = [ ]

   (b) The incoming squadron will have 350ft between each plane – what is the maximum RADAR pulse width required to distinguish the planes?

   τ = [ ]

(c) For the conditions specified, what will be the maximum line of sight distance between the RADAR and the lead aircraft?

$R_{LOS} =$ ☐

(d) What is the maximum distance from which the RADAR will detect the planes?

$R_{RADAR} =$ ☐

(e) What is the maximum distance from which the lead aircraft's RWR will detect the RADAR?

$R_{RWR} =$ ☐

(f) Who will see who first, and at what range? Answer =

(g) If the planes would like to reduce R_{LOS} to 80km, what altitude would they have to drop down to? Altitude =

(h) The RADAR's return frequency is 1.000000866 GHZ, and the approach angle of the planes is 25°. What is the speed of the planes, in mph. Speed =