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

$$\begin{split} \sigma &= 8m^2 \\ G_R &= 3.2 \\ P_{r,min,\ RWR} &= 400nW \\ altitude &= 3500ft,\ AGL \end{split}$$

The RADAR installation has the following characteristics:

$$\begin{split} f &= 900 \text{MHz} \\ G_T &= 250 \\ P_T &= 9 \text{kW} \\ P_{r,\text{min,RADAR}} &= 15 \text{fW} \\ \text{altitude} &= 175 \text{ft, AGL} \end{split}$$

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

$$R_{LOS} =$$
 165 km

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

$$R_{RWR} =$$
 113 km

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

$$R_{RADAR} = 64.0 \text{ km}$$

(d) Who will see who first, and at what range?

2. For the data given in Problem 1, what would be the planes' new altitude so that the line-of-sight distance matches the RWR detection distance?

Altitude = 1,310 ft

3. For the data given in Problem 1, what is the minimum RCS value (σ) required for the RADAR to be able to detect the plane at the original LOS distance?

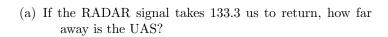
 $\sigma = \boxed{ 351 \ m^2}$

4. The RCS of a fighter is approximately 20 square meters. The RCS of a missile is approximately 0.2 square meters. How many times farther away can the fighter be detected than the missile?

 $\sigma = \begin{bmatrix} 3.16 \text{ times farther} \end{bmatrix}$

5. During an exercise, a UAS is used to gather information on the red forces. The red team has deployed a mobile RADAR unit, with the following parameters:

RADAR unit	UAS
Frequency = 450 MHz	$RCS = 0.4 m^2$
Transmit Power = 1.5 kW	Receive antenna gain $= 3$
Antenna gain = 200	Minimum power received = 1.25 μW
Minimum power received $= 1 \text{ fW}$	



$$R_{LOS} =$$
 20.0 km

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(b) How much power is received by the RADAR if the UAS is
$$30 \text{ km}$$
 from the RADAR?

$$R_{RWR} =$$
 6.64 fW

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

$$R_{LOS} =$$
 47.47 km

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

$$R_{RWR} = 45.02 \text{ km}$$

(e) What is the maximum distance from which the RADAR will detect the UAS?

$$R_{RADAR} =$$
 48.15 km

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