OHW2-2 Soln)

a)

If we're observing at larger distances, we can still make use of the relationship to get a good approximation:

$d\sin\theta_m = m\lambda \quad m = 0, {}^{+}/_{-}1, {}^{+}/_{-}2, ...$

where d = 12m and $\lambda = c/f = 3\text{x}10^8/107.9\text{x}10^6 = 2.78\text{m}$

$\sin\theta_1 = (1)\lambda/d = 0.232 \rightarrow$ **$\theta_1 = 13.4^o$**

$\sin\theta_2 = (2)\lambda/d = 0.463 \rightarrow$ **$\theta_2 = 27.6^o$**

$\sin\theta_3 = (3)\lambda/d = 0.695 \rightarrow$ **$\theta_3 = 44.0^o$**

$\sin\theta_4 = (4)\lambda/d = 0.928 \rightarrow$ **$\theta_4 = 68.1^o$**

$\sin\theta_5 = (5)\lambda/d = 1.16 \rightarrow$ No more angles

This pattern is mirrored in all four quadrants about the line joining the antennas and about the line that perpendicularly bisects *that* line.

b)

If we're observing at larger distances, we can still make use of the relationship to get a good approximation:

$d\sin\theta_m = (m + {}^{1}/_{2})\lambda \quad m = 0, {}^{+}/_{-}1, {}^{+}/_{-}2, ...$

where d = 12m and $\lambda = c/f = 3\text{x}10^8/107.9\text{x}10^6 = 2.78\text{m}$

$\sin\theta_1 = (0.5)\lambda/d = 0.116 \rightarrow$ **$\theta_1 = 6.65^o$**

$\sin\theta_2 = (1.5)\lambda/d = 0.348 \rightarrow$ **$\theta_2 = 20.3^o$**

$\sin\theta_3 = (2.5)\lambda/d = 0.579 \rightarrow$ **$\theta_3 = 35.4^o$**

$\sin\theta_4 = (3.5)\lambda/d = 0.811 \rightarrow$ **$\theta_4 = 54.2^o$**

$\sin\theta_5 = (4.5)\lambda/d = 1.04 \rightarrow$ No more angles

This pattern is mirrored in all four quadrants about the line joining the antennas and about the line that perpendicularly bisects *that* line.