

1) A) Given: $P = .5 \text{ W}$
 $x_1 = 2.00 \text{ m}$
 $x_2 = 4.00 \text{ m}$
 $I_1 = ?$ $I_2 = ?$

Soln:

$$I = \frac{P}{4\pi x^2}$$

$$I_1 = \frac{.5 \text{ W}}{4\pi (2.00 \text{ m})^2}$$

$$= 9.9 \times 10^{-3} \text{ W/m}^2$$

$$I_2 = \frac{.5 \text{ W}}{4\pi (4.00 \text{ m})^2}$$

$$I_1 = 1.0 \times 10^{-2} \text{ W/m}^2 \text{ to } I_2 = 3.1 \times 10^{-3} \text{ W/m}^2$$

B) Given: $x_1 = 8.00 \text{ m}$
 $x_2 = 12.00 \text{ m}$

$$I_1 = \frac{.5 \text{ W}}{4\pi (8.00 \text{ m})^2}$$

$$I_2 = \frac{.5 \text{ W}}{4\pi (12.00 \text{ m})^2}$$

$$I_1 = 6 \times 10^{-4} \text{ W/m}^2 \text{ to } I_2 = 3 \times 10^{-4} \text{ W/m}^2$$

C) Given: $x_1 = 50.0 \text{ m}$

$$I = \frac{.5 \text{ W}}{4\pi (50.0 \text{ m})^2}$$

$$I = 2.0 \times 10^{-5} \text{ W/m}^2 \text{ from Table } 70 \text{ dB}$$

2 A) From Table $I = 1.0 \times 10^{-2} \text{ W/m}^2$ for 100 dB

B) Given: $I = 1.0 \times 10^{-2} \text{ W/m}^2$
 $x = 5.00 \text{ m}$

Soln: $I = \frac{P}{4\pi x^2}$

$$P = I 4\pi x^2$$

$$= (1.0 \times 10^{-2} \frac{\text{W}}{\text{m}^2}) 4\pi (5.00 \text{ m})^2$$

$$P = 3.1 \text{ W}$$

C) Given: $I = 1.00 \times 10^{-8} \frac{\text{W}}{\text{m}^2}$
 $P = 3.1 \text{ W}$
 $x = ?$

Soln: $I = \frac{P}{4\pi x^2}$

$$x^2 = \frac{P}{4\pi I} = \frac{3.1 \text{ W}}{4\pi (1.00 \times 10^{-8} \frac{\text{W}}{\text{m}^2})}$$

$$x = 5.0 \times 10^3 \text{ m}$$