Question 1

Consider

$$z = e^{i\alpha} + e^{i\beta}$$

for and α and β.

Which of the following is true?

1. $z = e^{i(\alpha+\beta)} e^{i(\alpha-\beta)}$
2. $z = e^{i(\alpha+\beta)/2} e^{i(\alpha-\beta)}$
3. $z = e^{i(\alpha+\beta)/2} \left[e^{i(\alpha-\beta)/2} + e^{i(\alpha-\beta)/2} \right]$
4. $z = e^{i(\alpha+\beta)/2} \left[e^{i(\alpha-\beta)/2} + e^{-i(\alpha-\beta)/2} \right]$
5. $z = e^{i(\alpha+\beta)/2} \left[e^{i(\alpha-\beta)/2} - e^{i(\alpha-\beta)/2} \right]$

Question 2

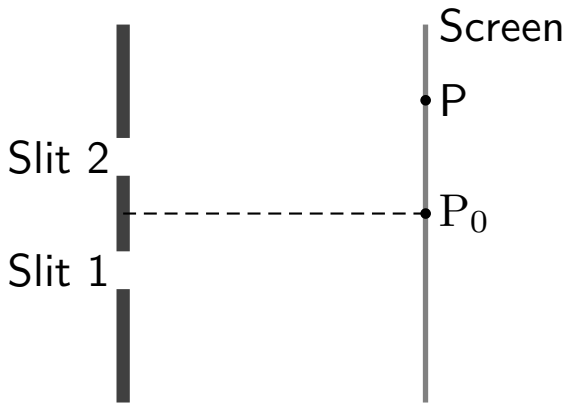
Two sources, separated by distance Δx, each oscillate with the same frequency, producing waves with the same wavenumber k.

When does constructive interference arise?

1. $\Delta x = 0, \frac{\pi}{k}, \frac{2\pi}{k}, \ldots$
2. $\Delta x = 0, \frac{2\pi}{k}, \frac{4\pi}{k}, \ldots$
3. $\Delta x = 0, \pi k, 2\pi k, \ldots$
4. $\Delta x = 0, 2\pi k, 4\pi k, \ldots$

Question 3

Waves pass from the left to the right through the two illustrated slits. The waves are such that they oscillate in phase at each slit.



Which of the following guarantees a maximum of intensity at any location on the screen?

1. $\Delta l = 0$ only.
2. $\Delta l = \lambda$ only.
3. $\Delta l = \lambda, 2\lambda, 3\lambda, \ldots$
4. $\Delta l = 0, \lambda, 2\lambda, 3\lambda, \ldots$