Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is one wavelength.



Which of the following is true regarding the difference in the distance traveled between the waves emanating from slit 1 and slit 4?

- 1.  $2\lambda$
- 2.  $2.5\lambda$
- 3.  $3\lambda$
- 4.  $3.5\lambda$
- 5.  $4\lambda$

Barrier

#### Waves from Four Sources: Constructive Interference

Successive sources offset by one wavelength.



Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is  $\frac{\lambda}{2}$ .



Barrier

Which of the following is true? (*Hint:* consider combinations of various pairs of waves, e.g. wave 1 and wave 2, then wave 3 and wave 4.)

- 1. The waves interfere destructively  $\Rightarrow$  dark fringe.
- 2. The waves interfere constructively  $\Rightarrow$  bright fringe.
- 3. Some waves interfere destructively others constructively  $\Rightarrow$  intermediate fringe.

### Waves from Four Sources: Destructive Interference

Successive sources offset by one half wavelength.



Consider four equally spaced slits and consider light waves that travel to one particular screen location. Suppose that the discrepancy in the distance traveled by the waves between adjacent slits is  $\frac{\lambda}{4}$ .



Barrier

Which of the following is true? (*Hint:* consider combinations of various pairs of waves)

- 1. The waves interfere destructively  $\Rightarrow$  dark fringe.
- 2. The waves interfere constructively  $\Rightarrow$  bright fringe.
- 3. Some waves interfere destructively others constructively  $\Rightarrow$  intermediate fringe.

## Waves from Four Sources: Destructive Interference

Successive sources offset by one quarter wavelength.



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#### Multiple slit patterns



Light with wavelength 600 nm passes through a diffraction grating with slit spacing 2000 nm.

How many bright fringes does this produce?

- 1. Only 1
- 2. Only 3
- 3. Only 4
- 4. Only 7
- 5. Infinitely many.