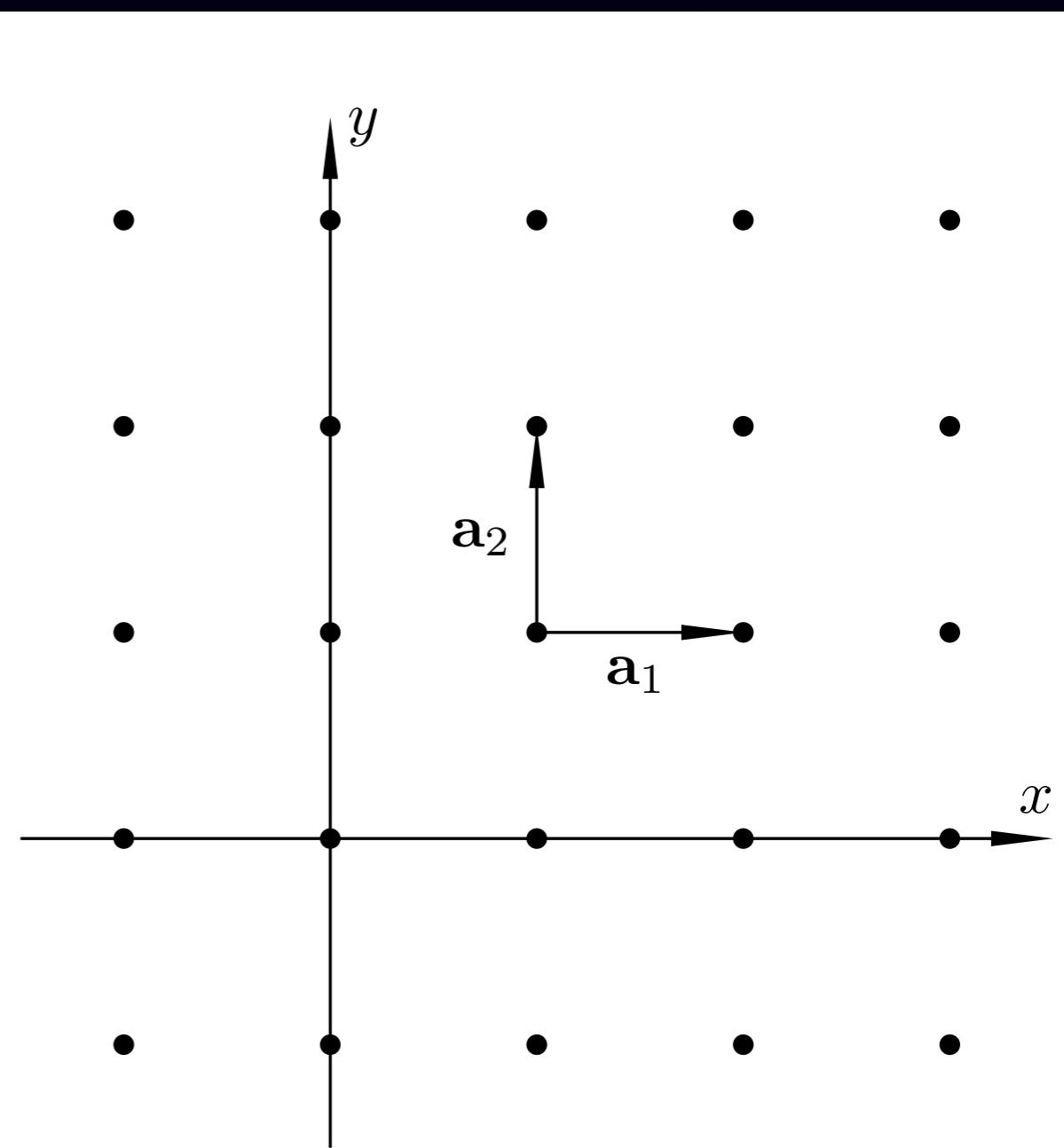
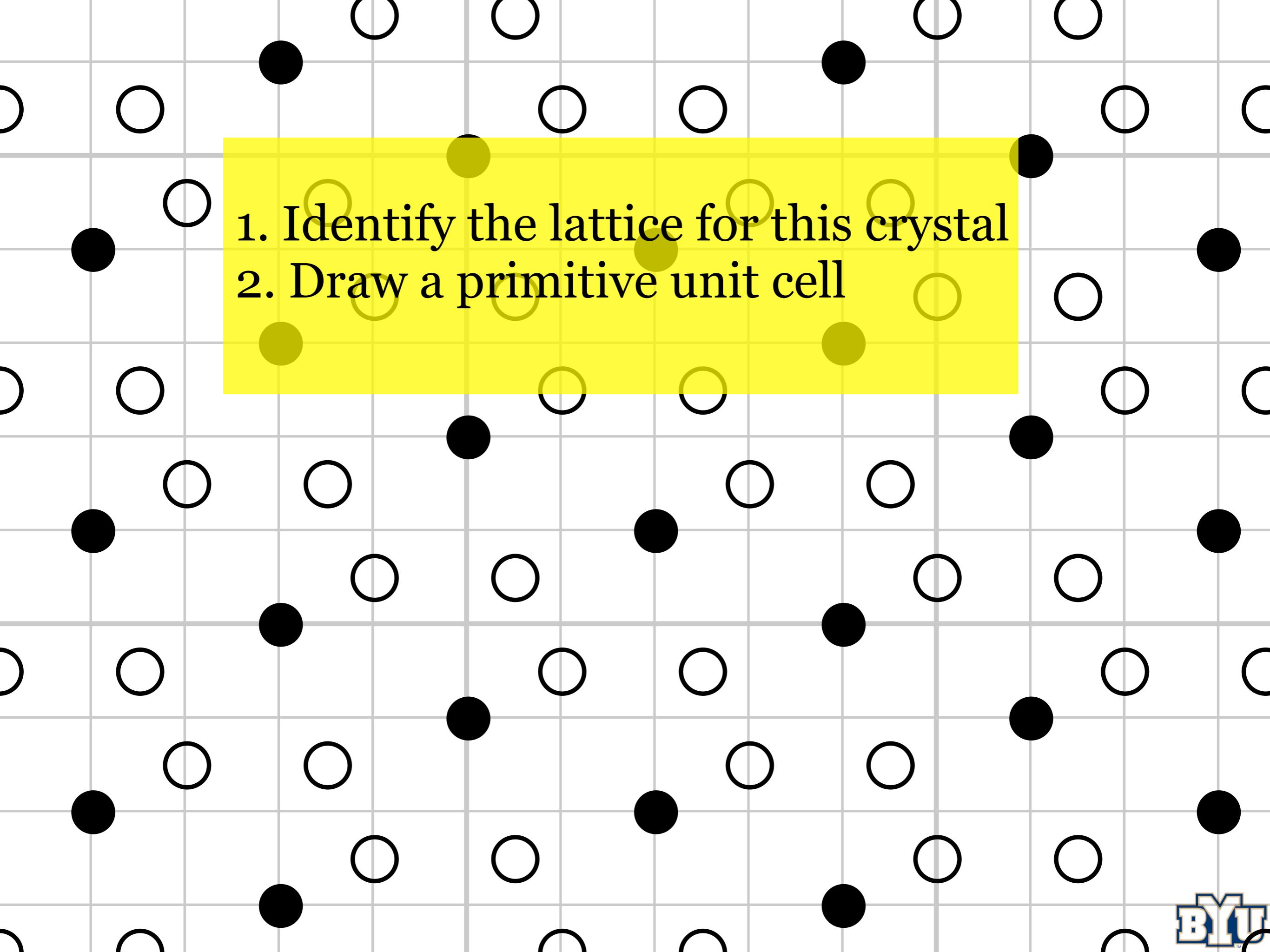


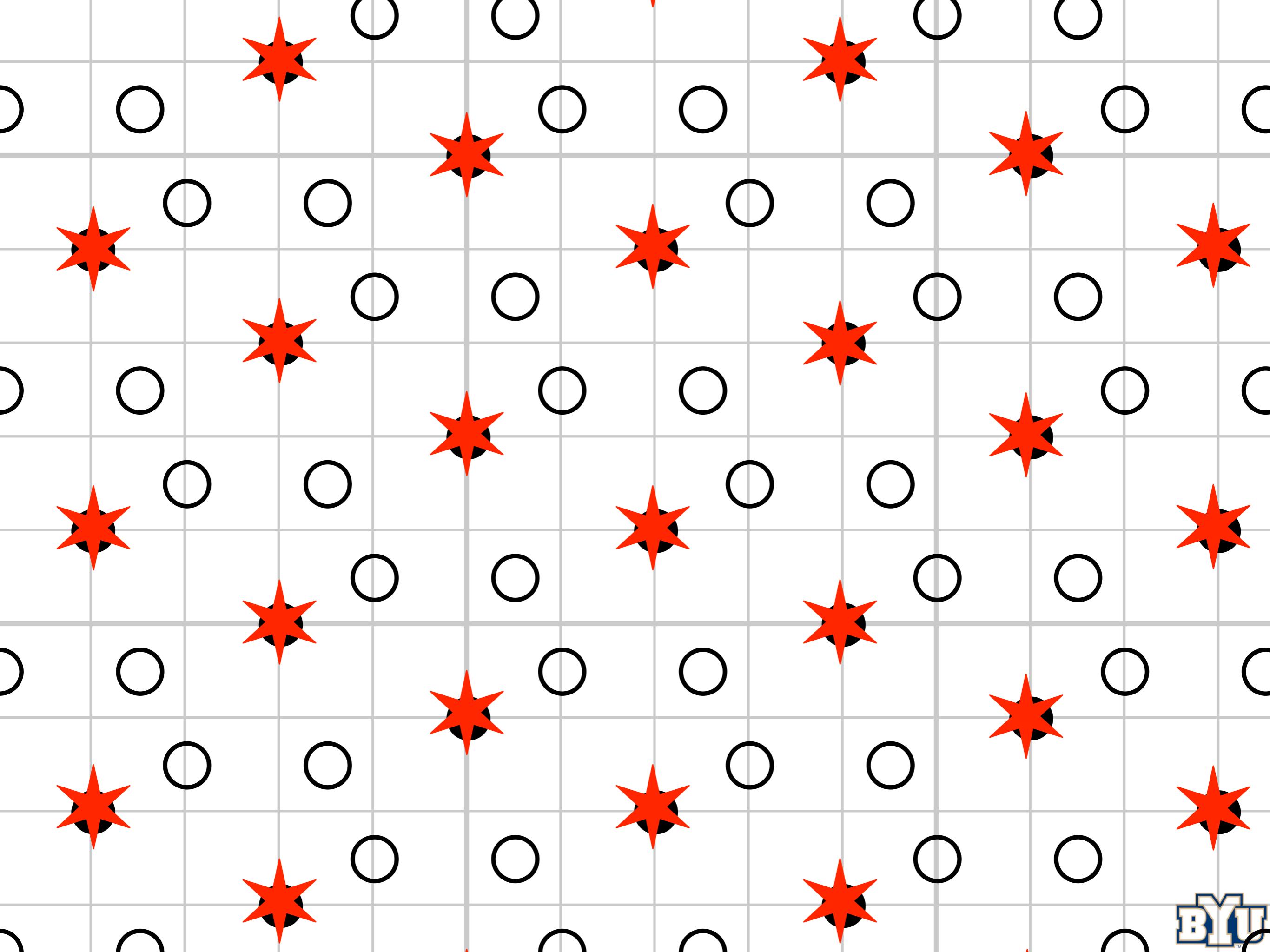
What is a lattice?

A *periodic* set of points

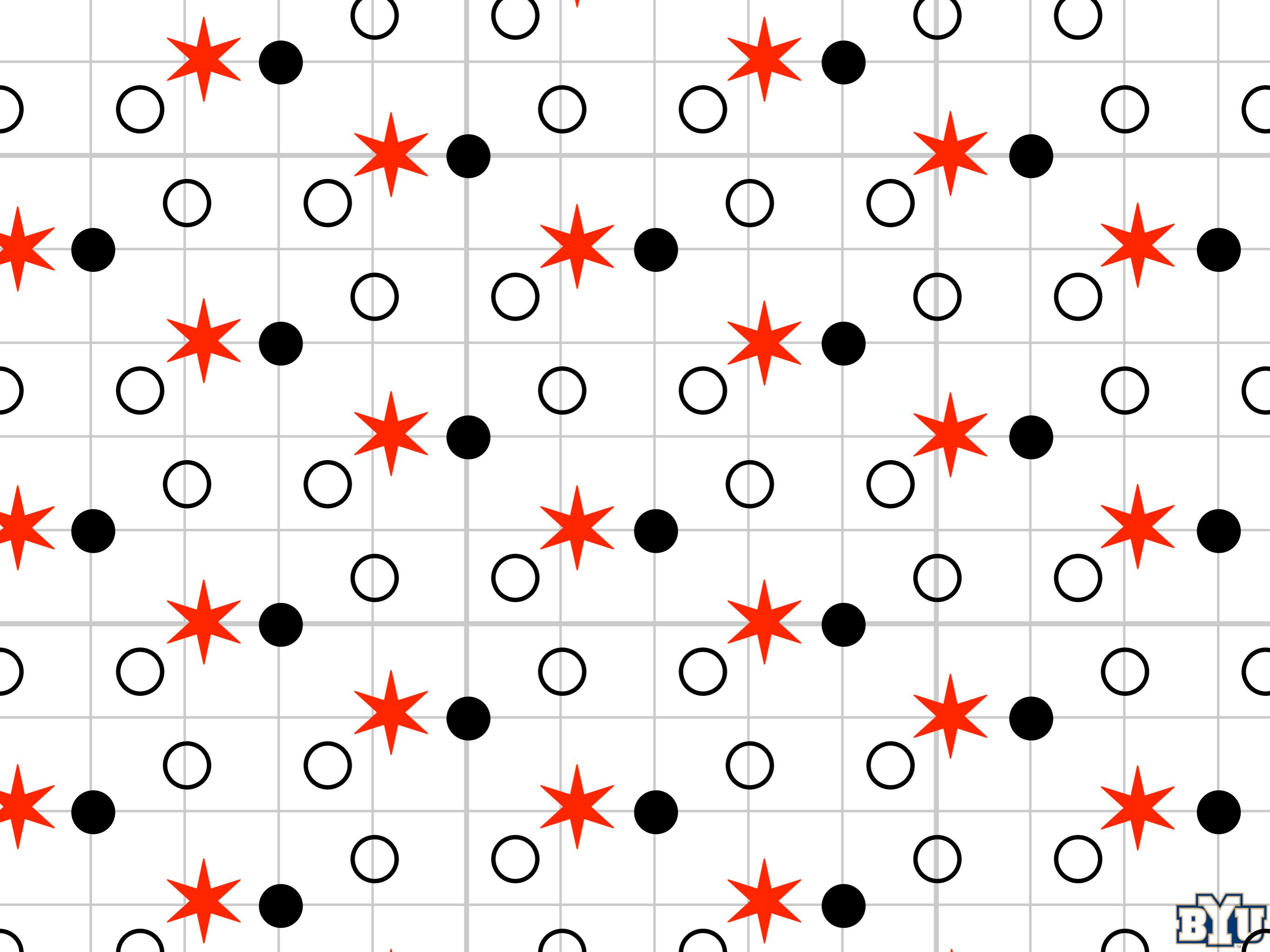
$$\mathbf{R} = n_1 \mathbf{a}_1 + n_2 \mathbf{a}_2$$

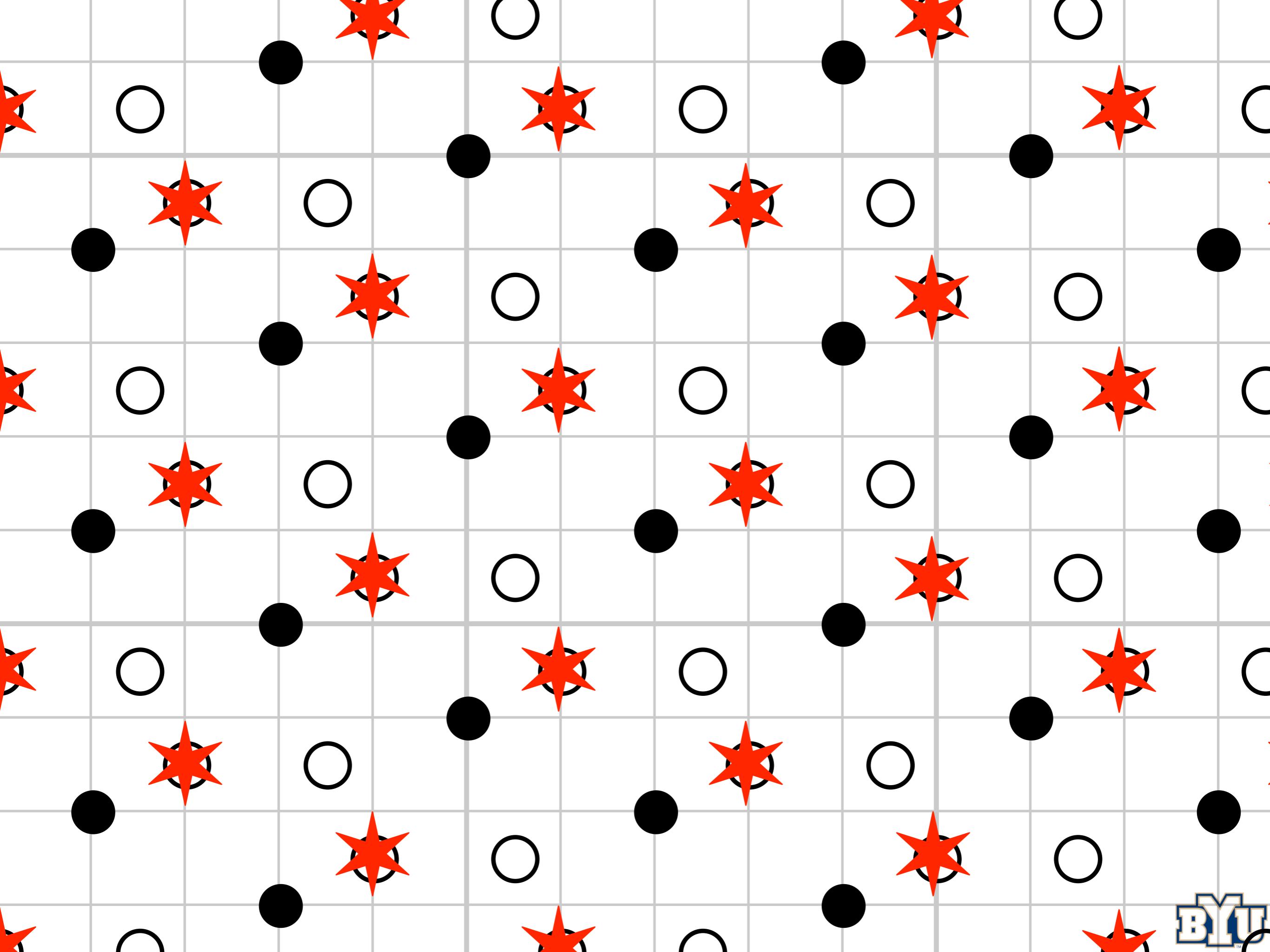


- 
1. Identify the lattice for this crystal
2. Draw a primitive unit cell

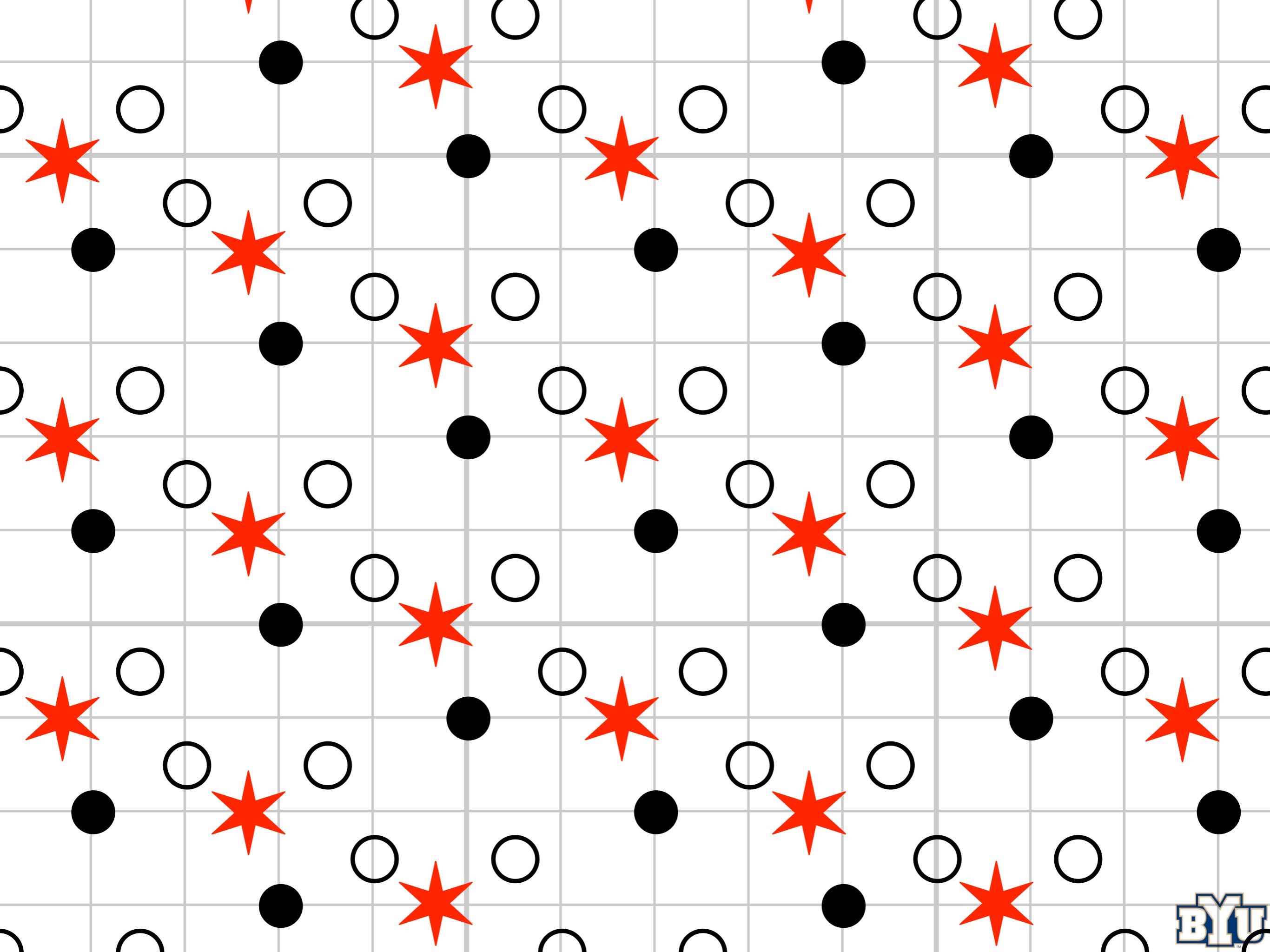


BYU

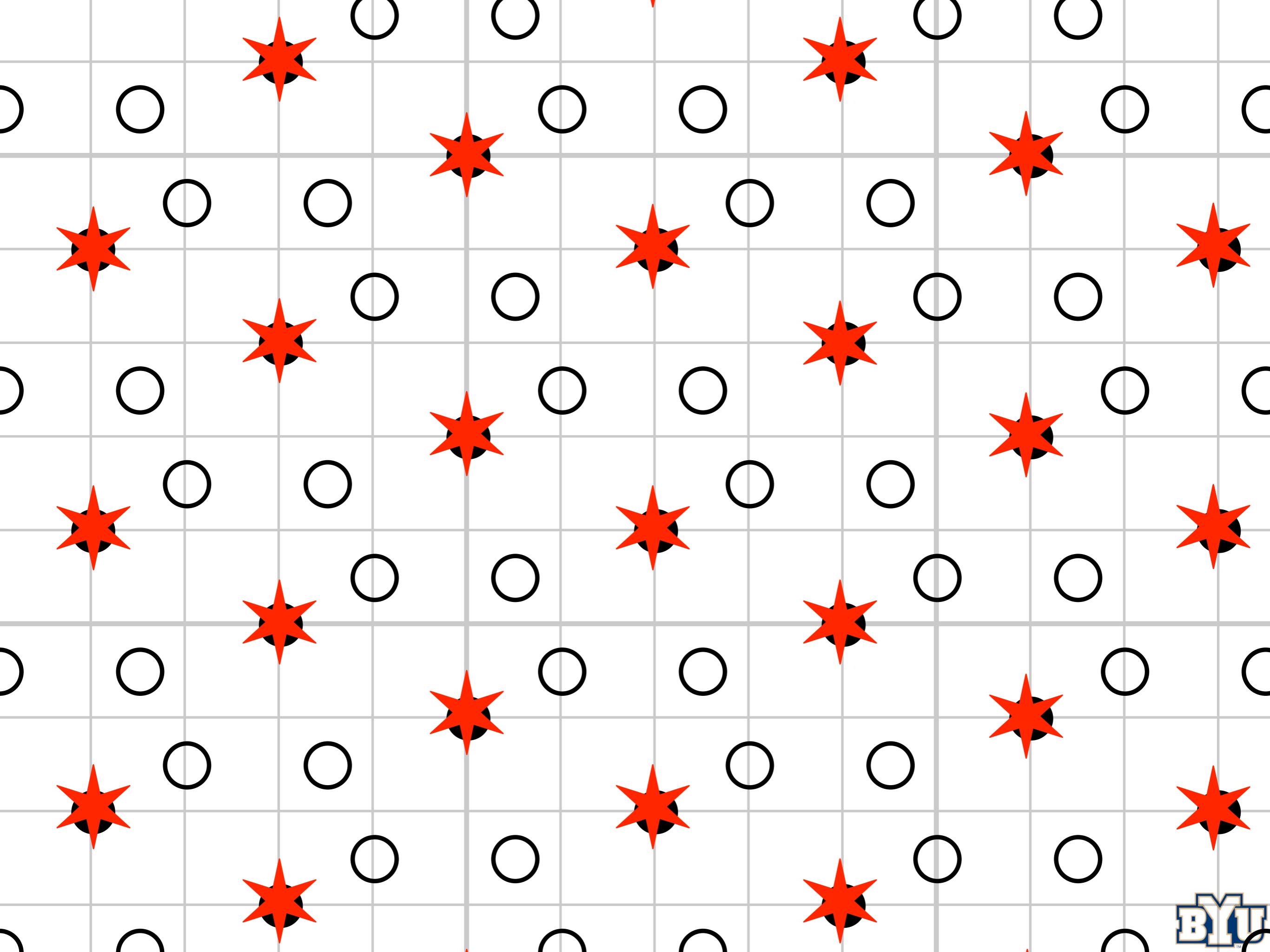




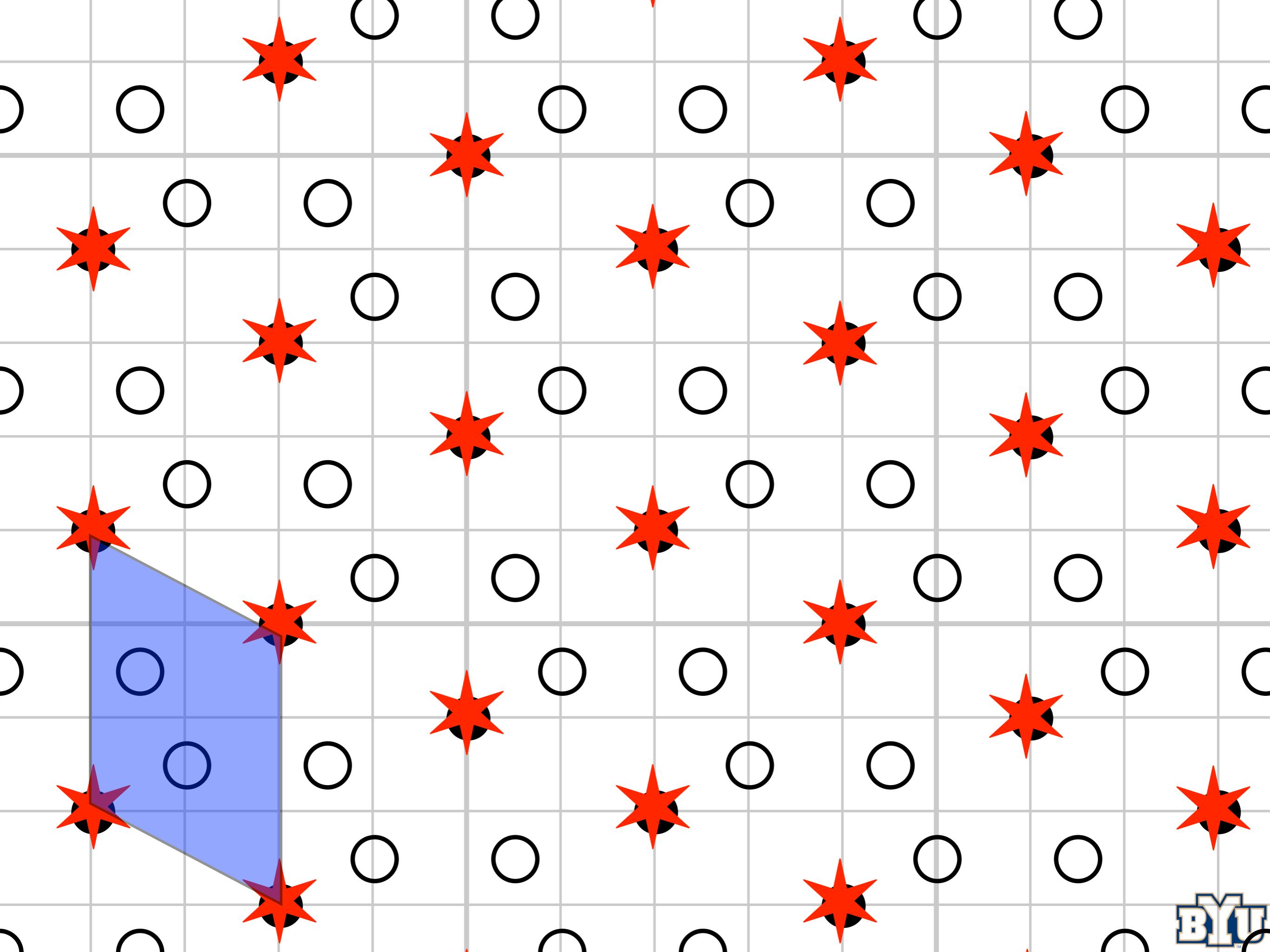
BYU

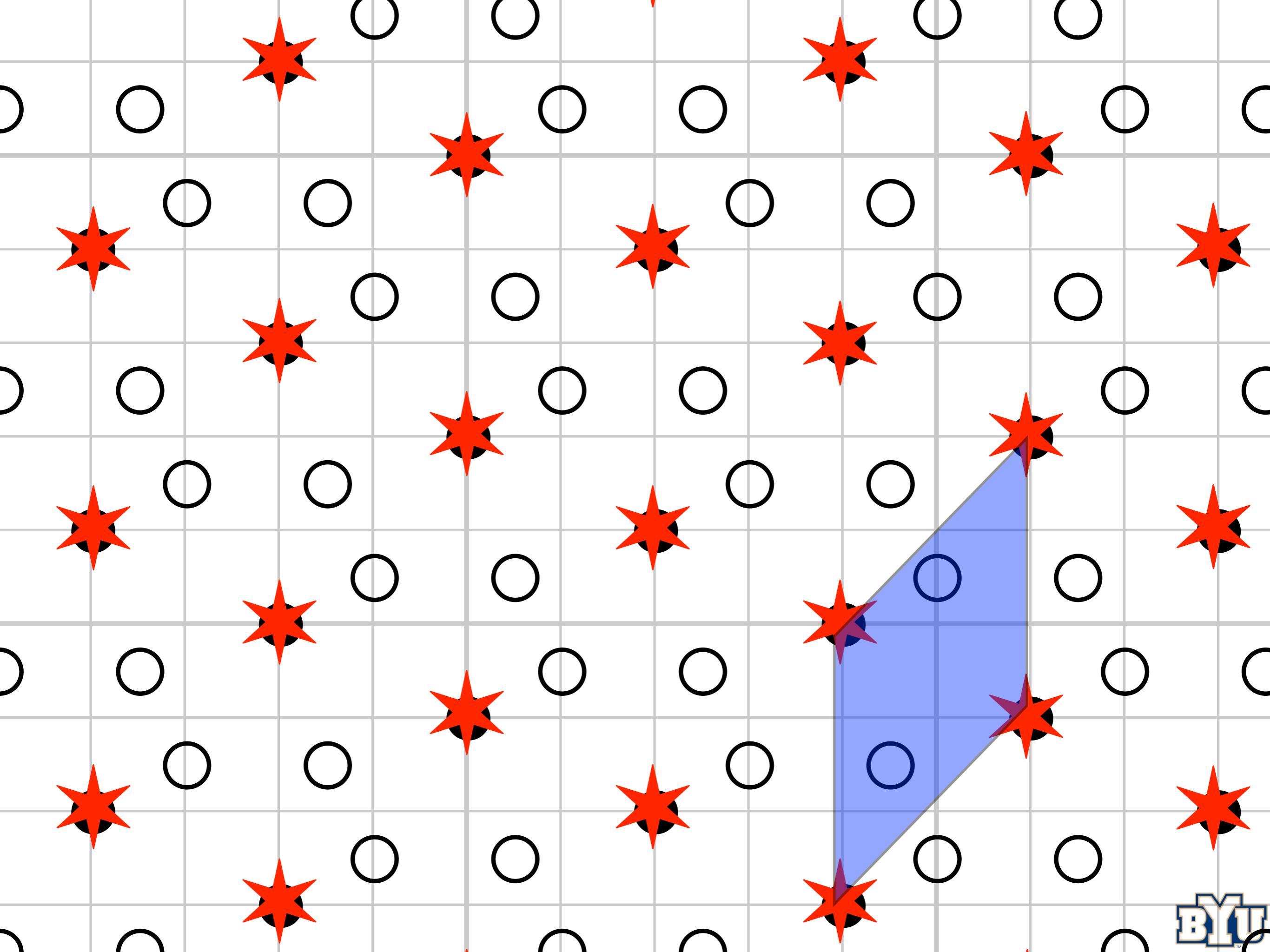


BYU

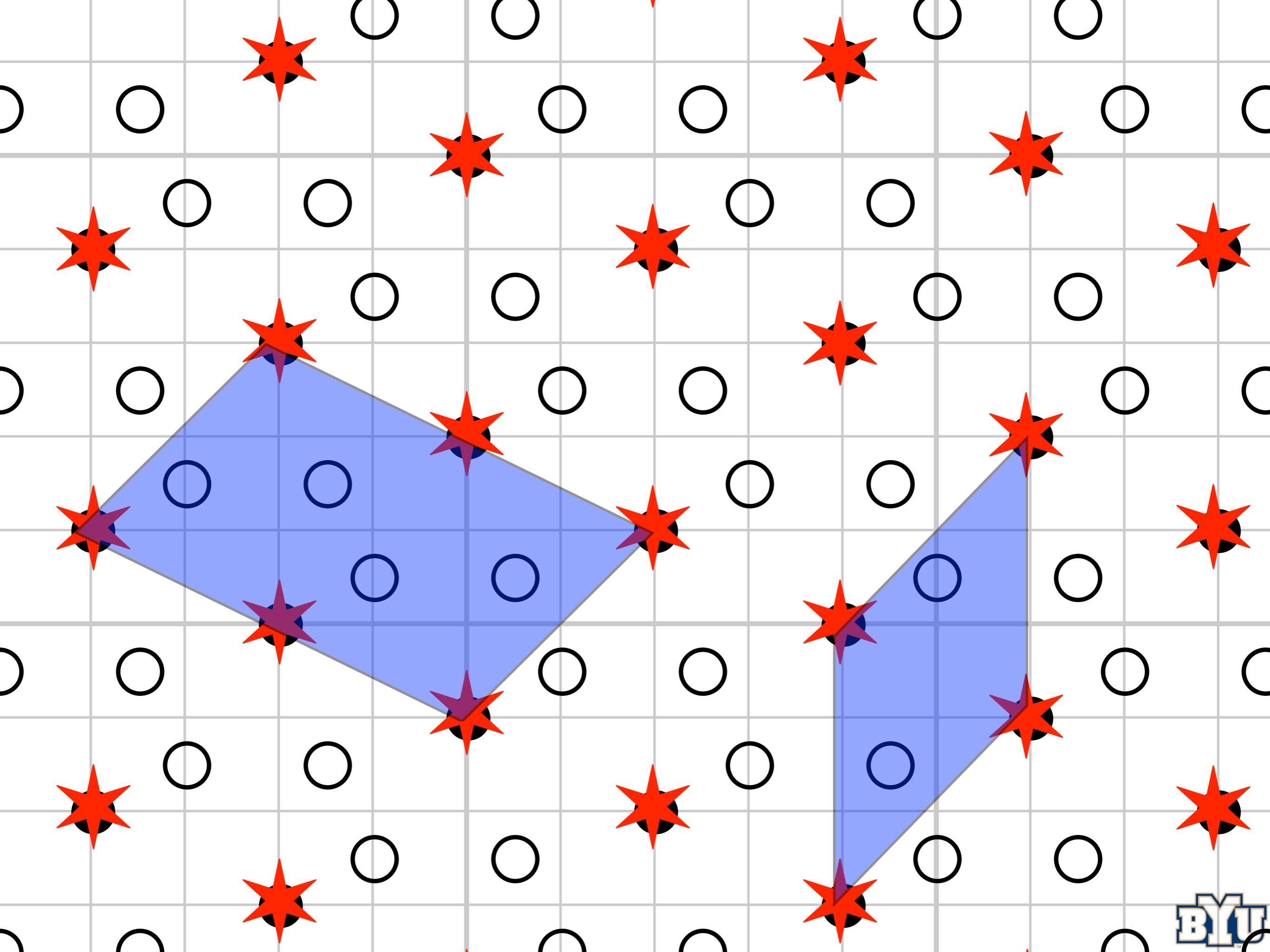


BYU

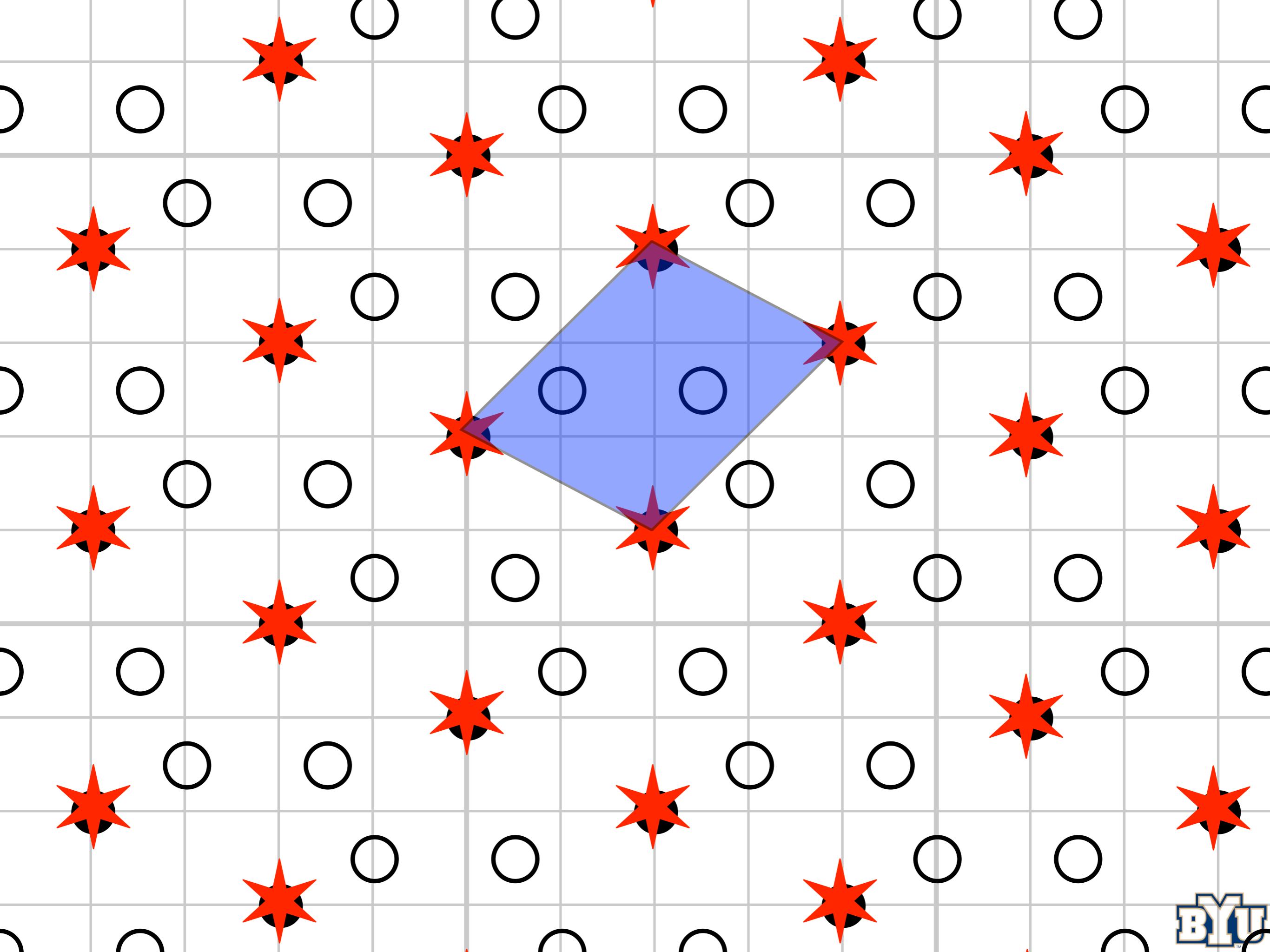




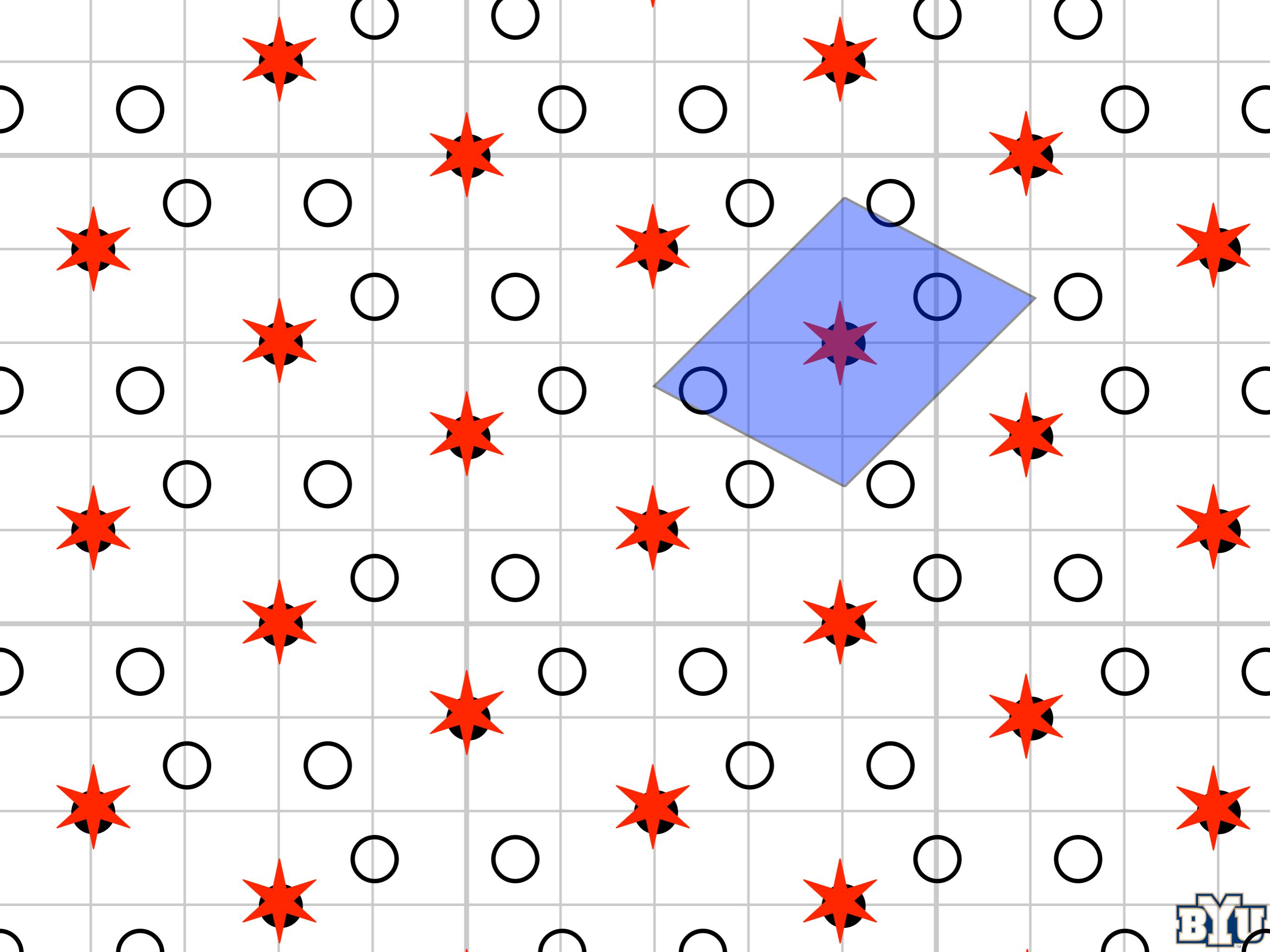
BYU



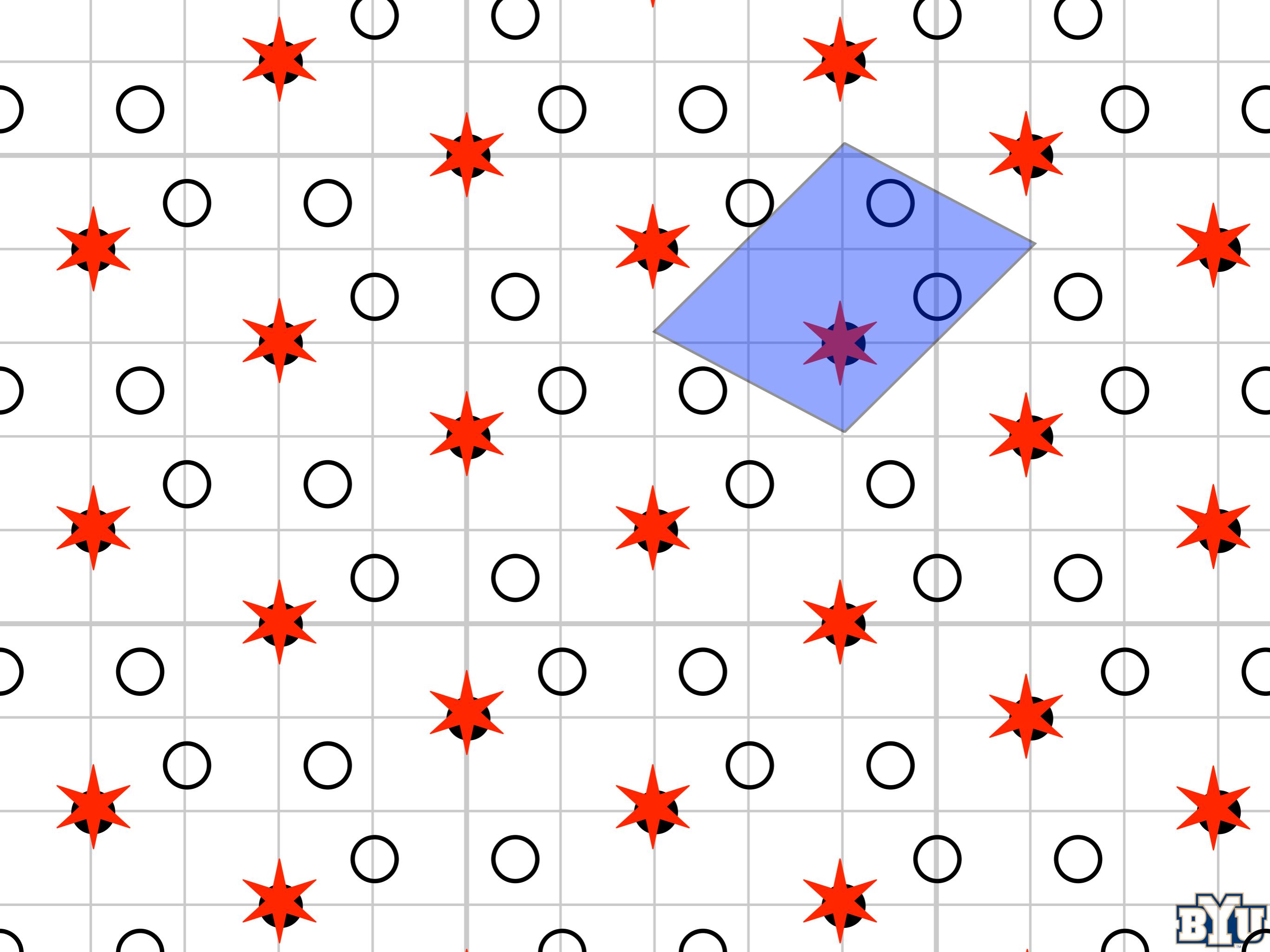
BYU



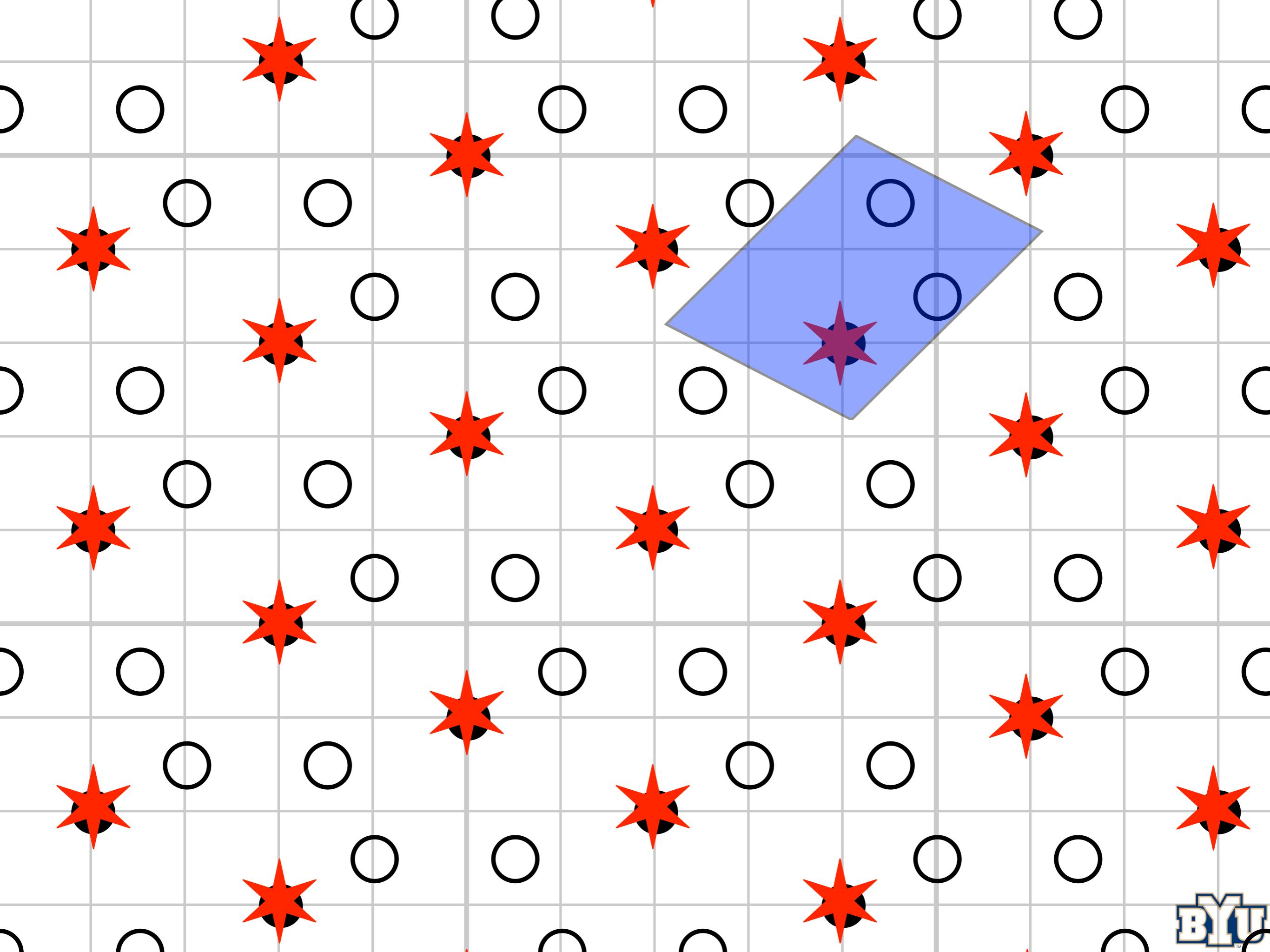
BYU



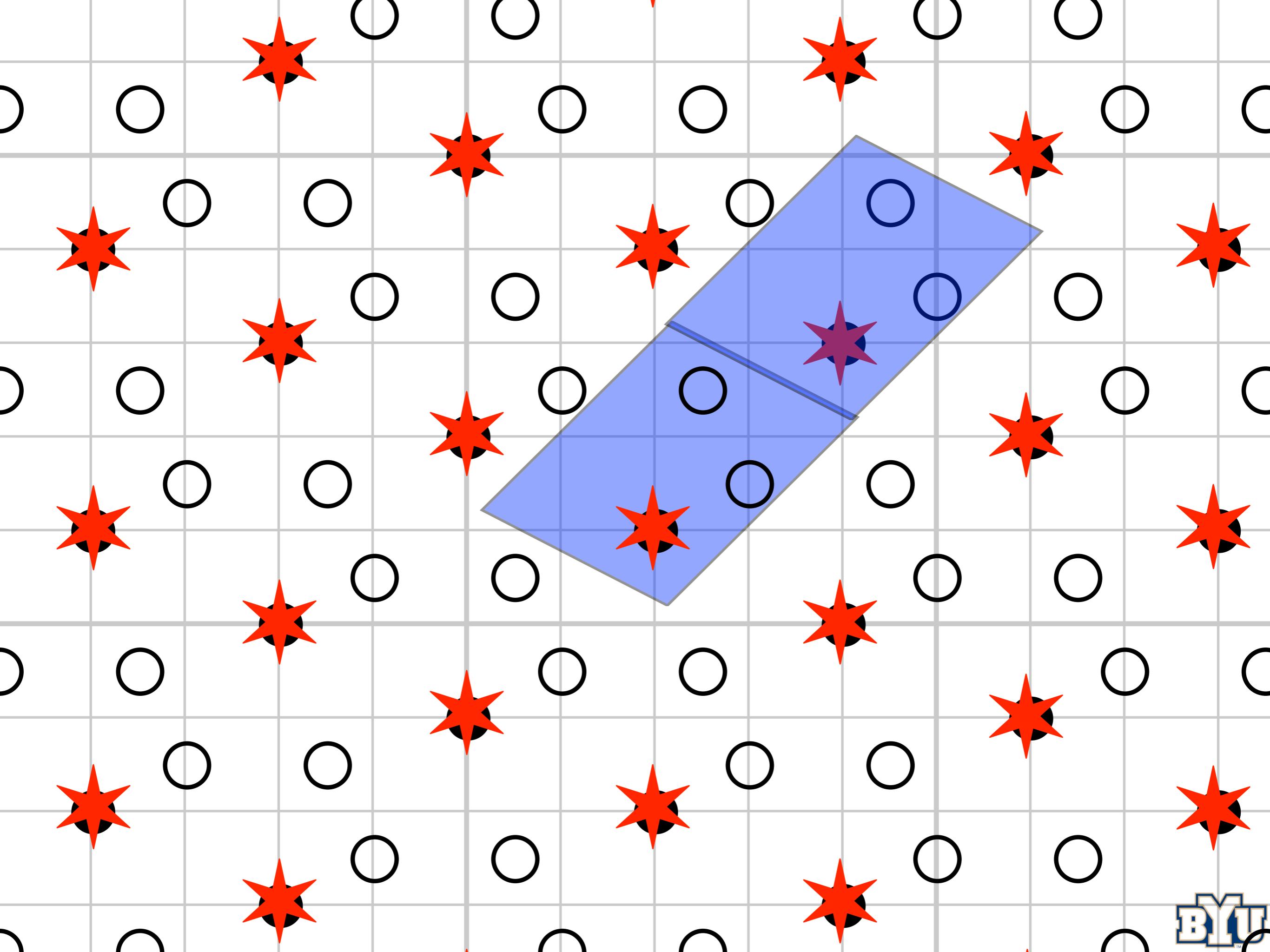
BYU



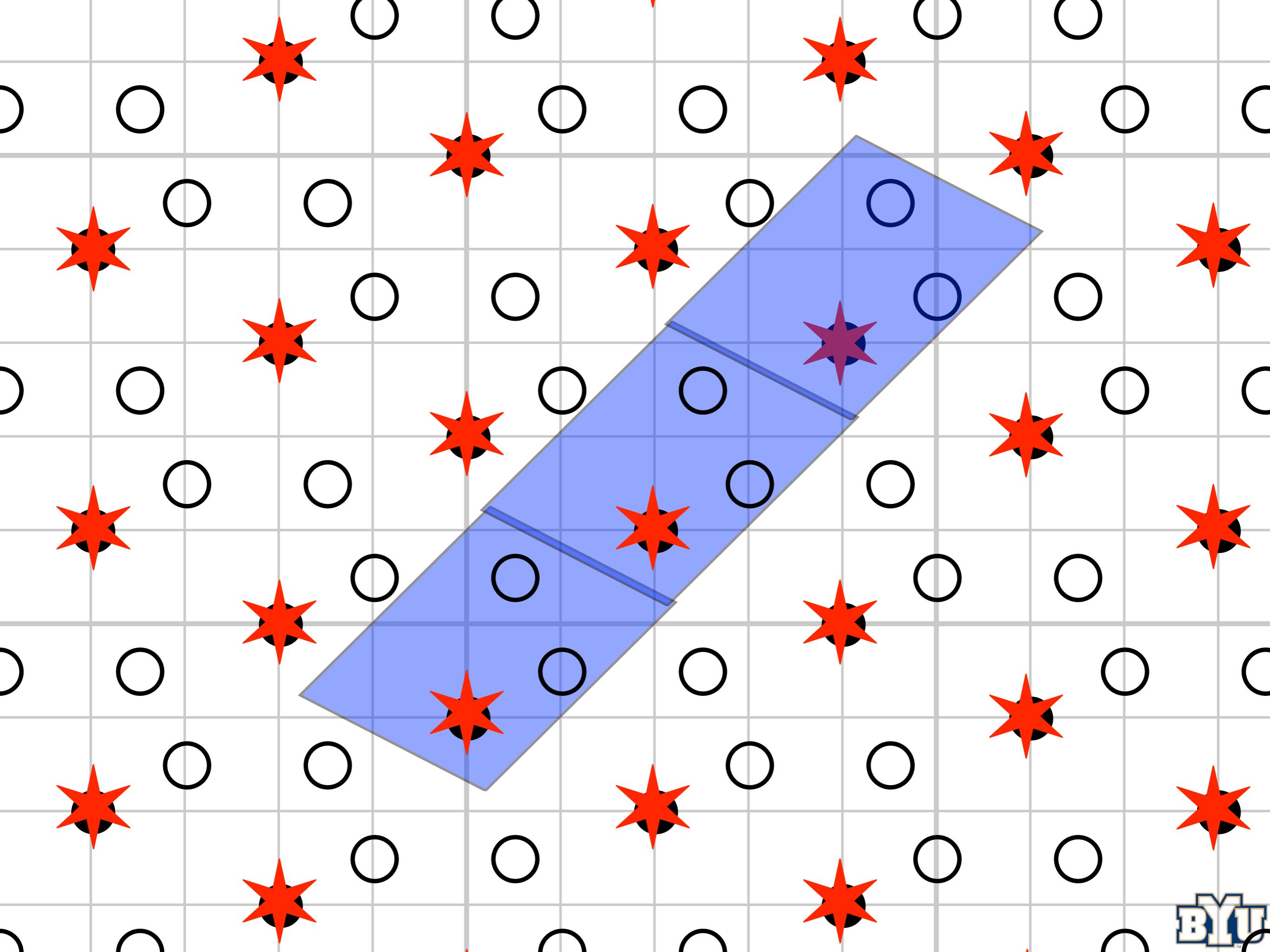
BYU



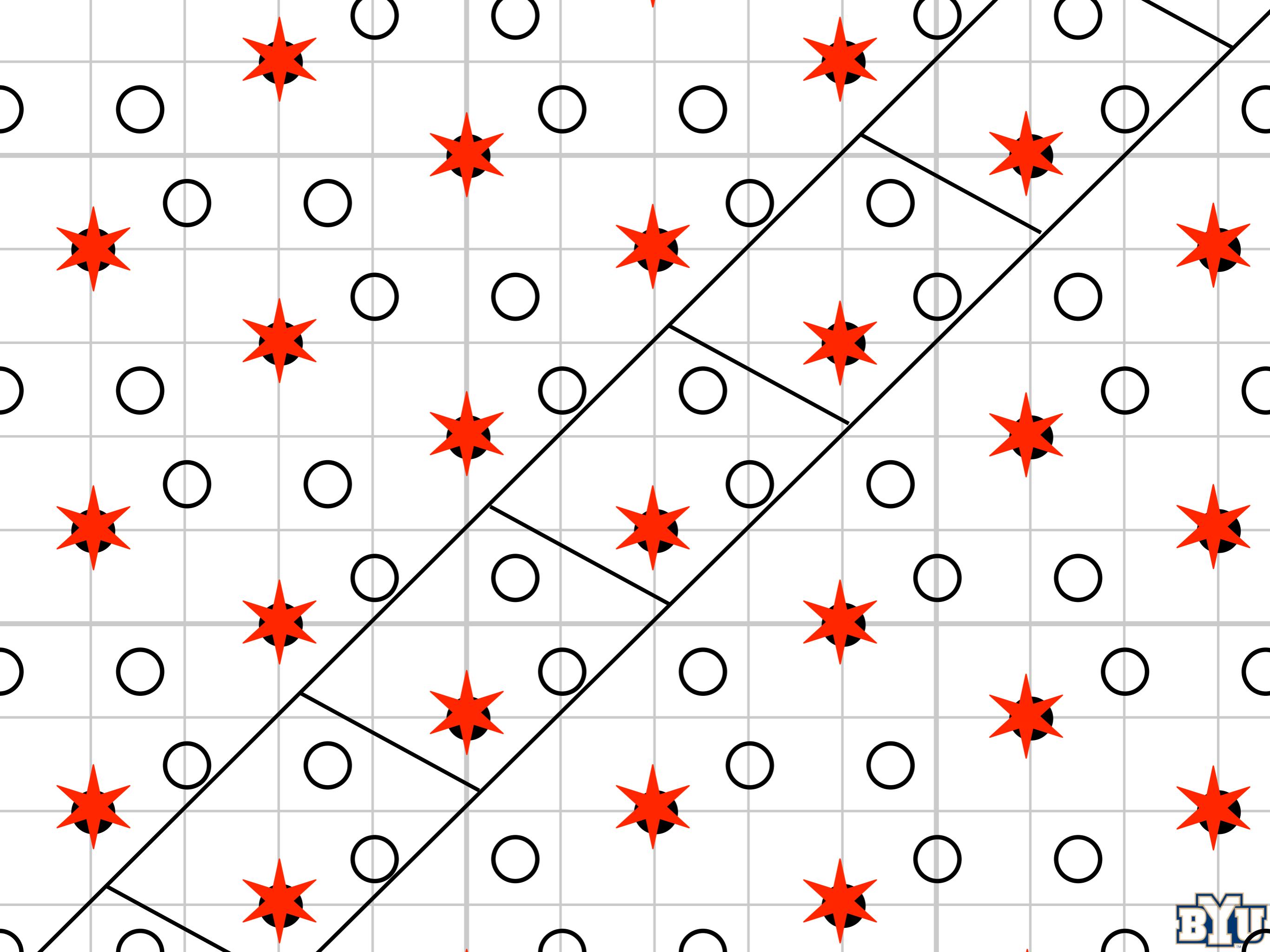
BYU



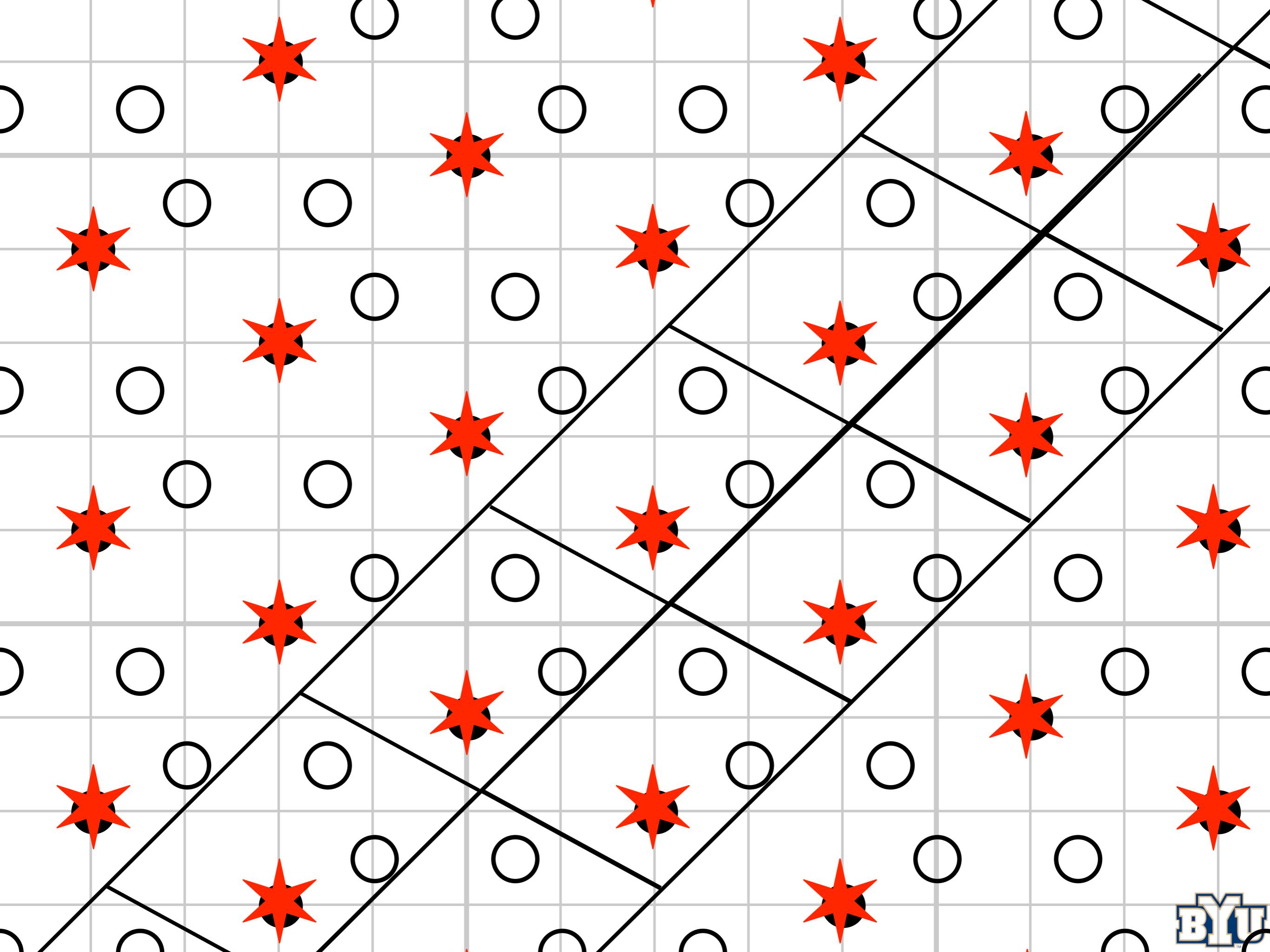
BYU



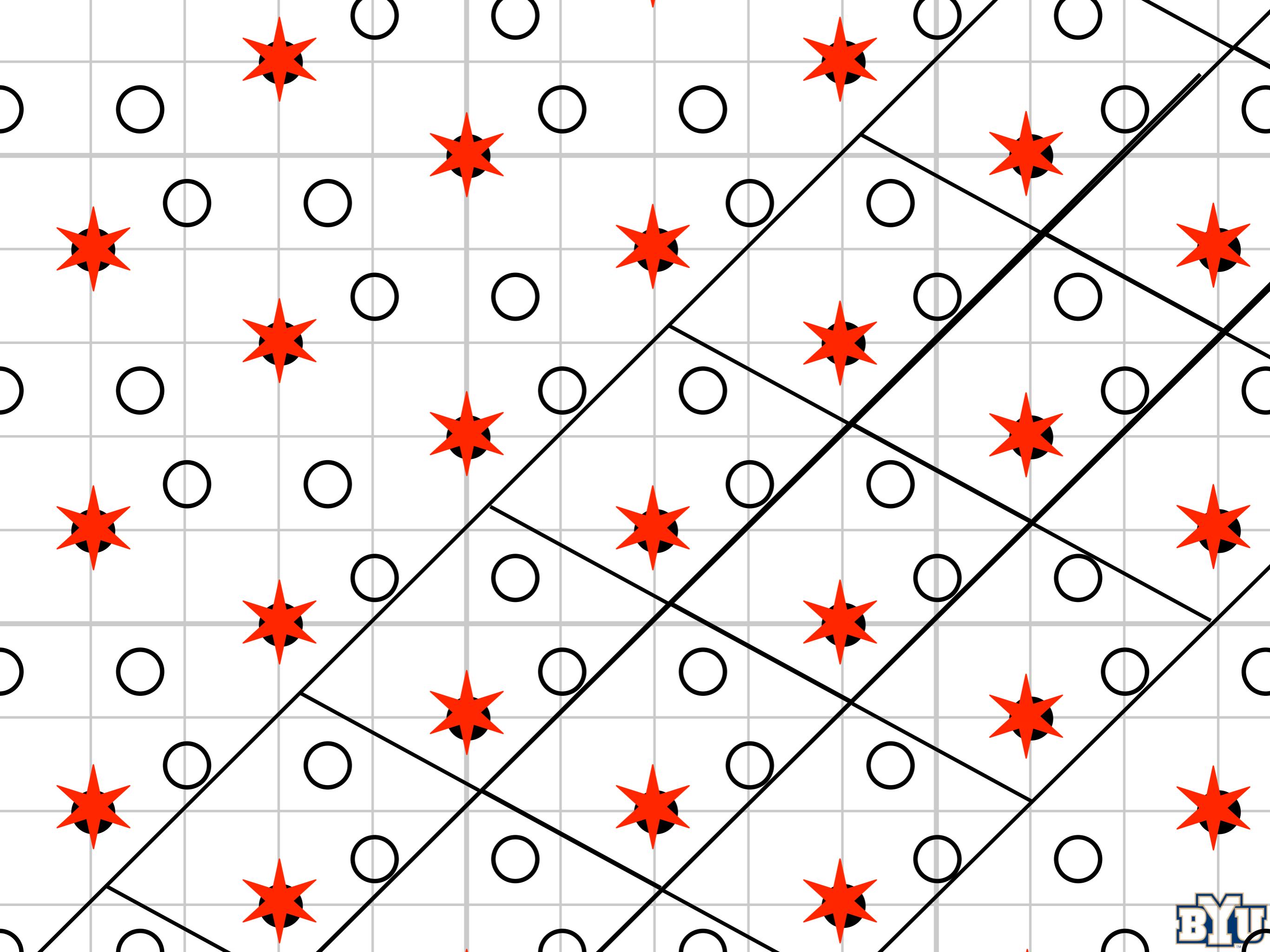
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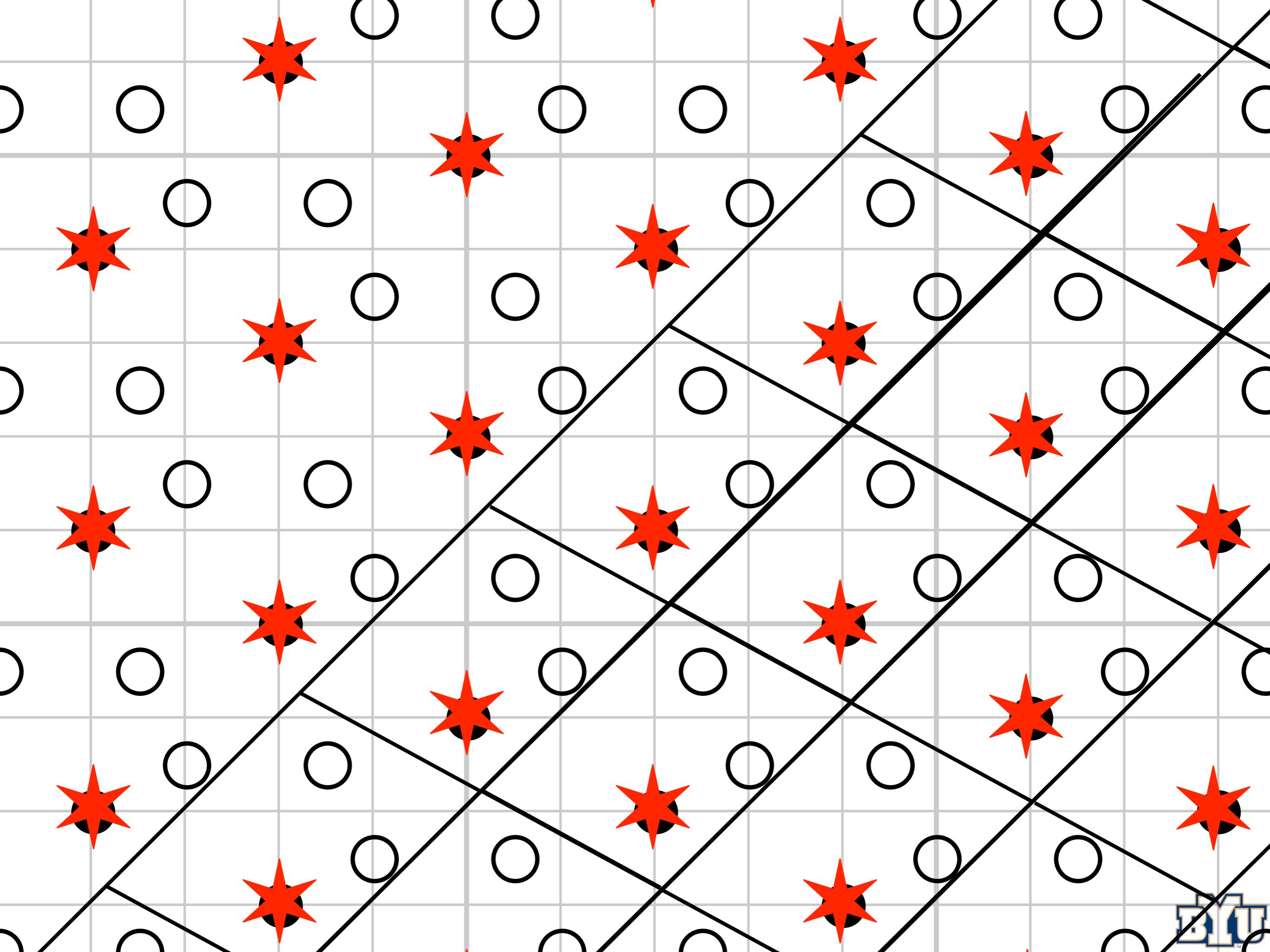
BYU



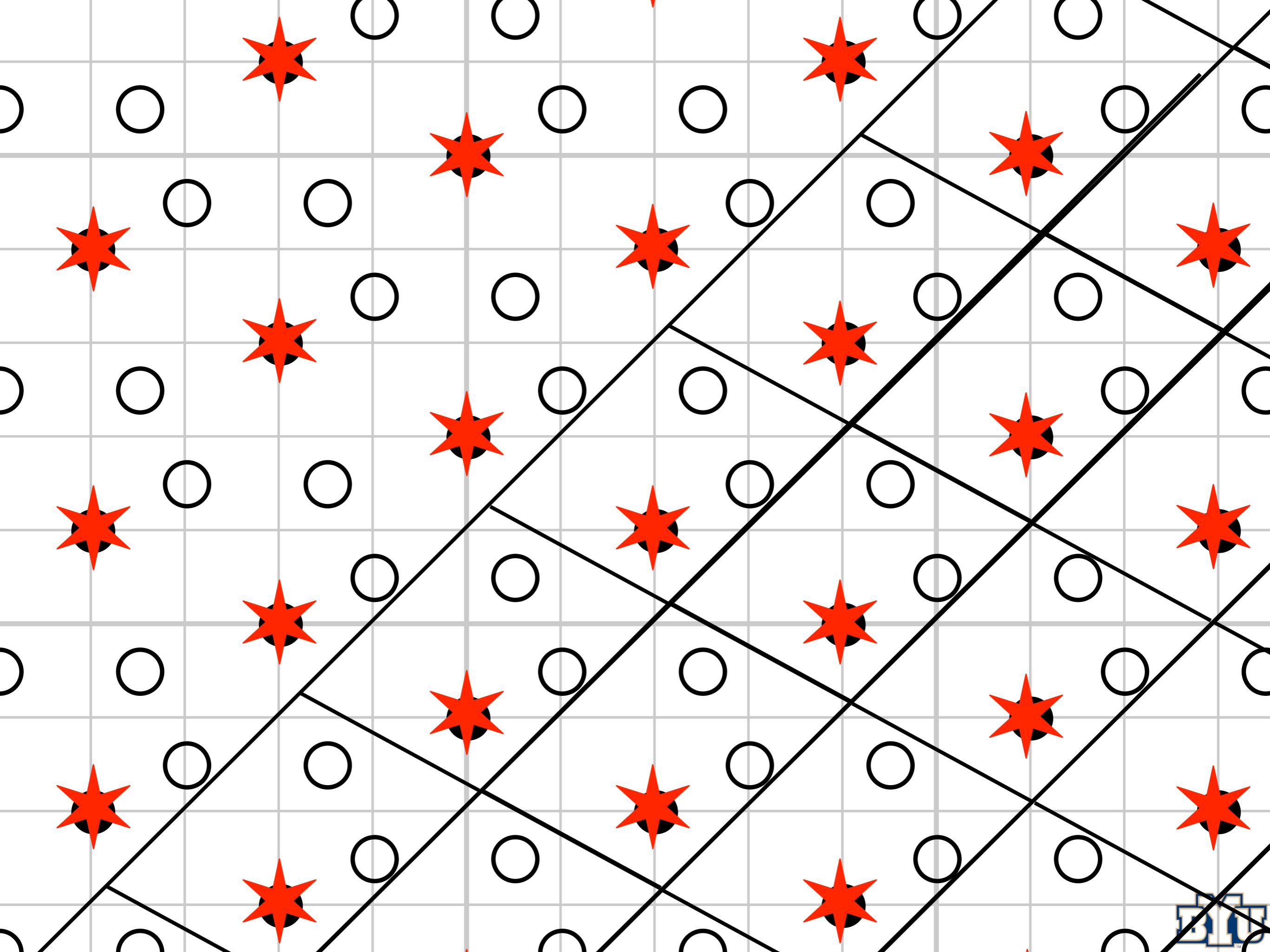
BYU



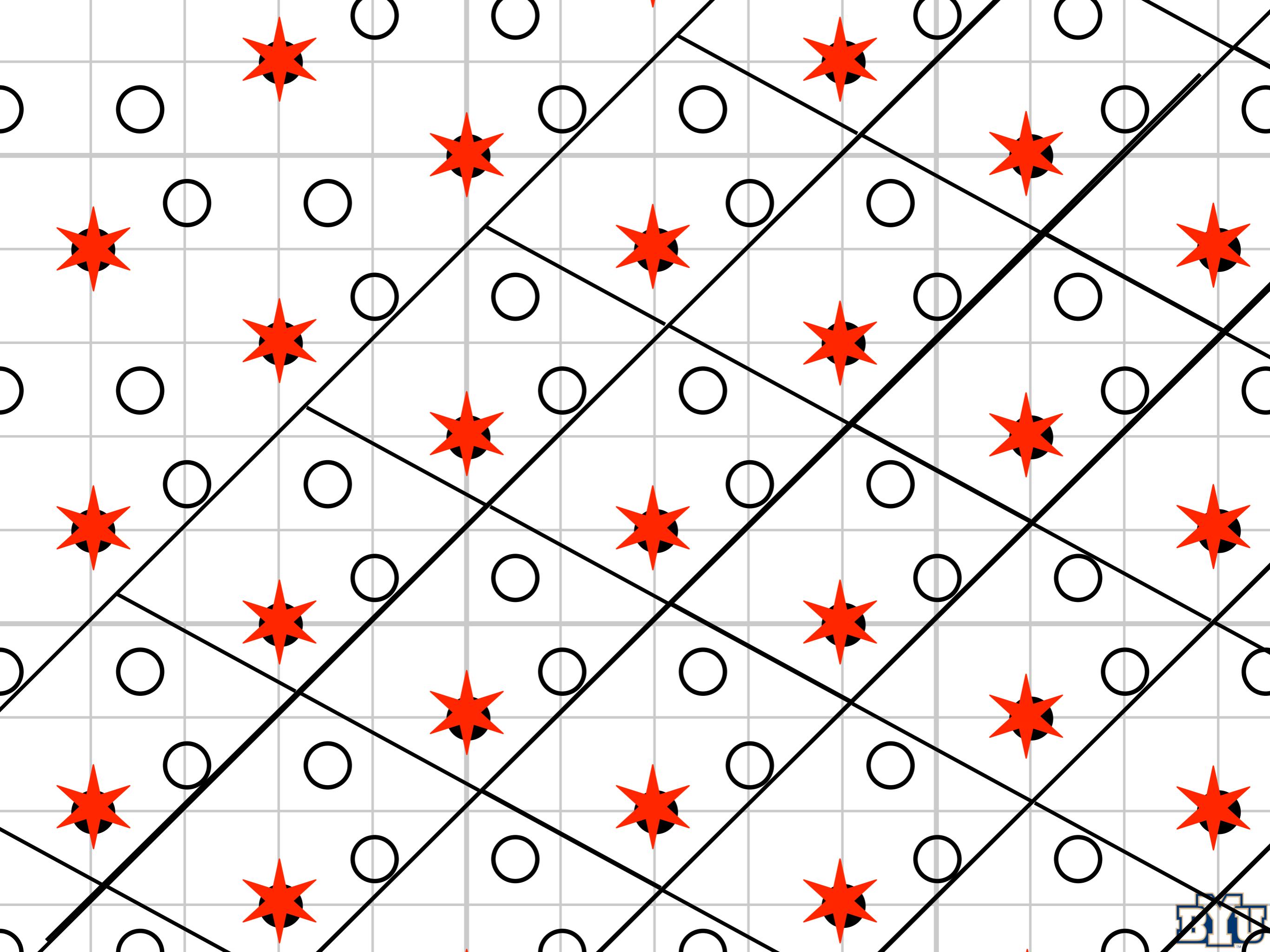
BYU



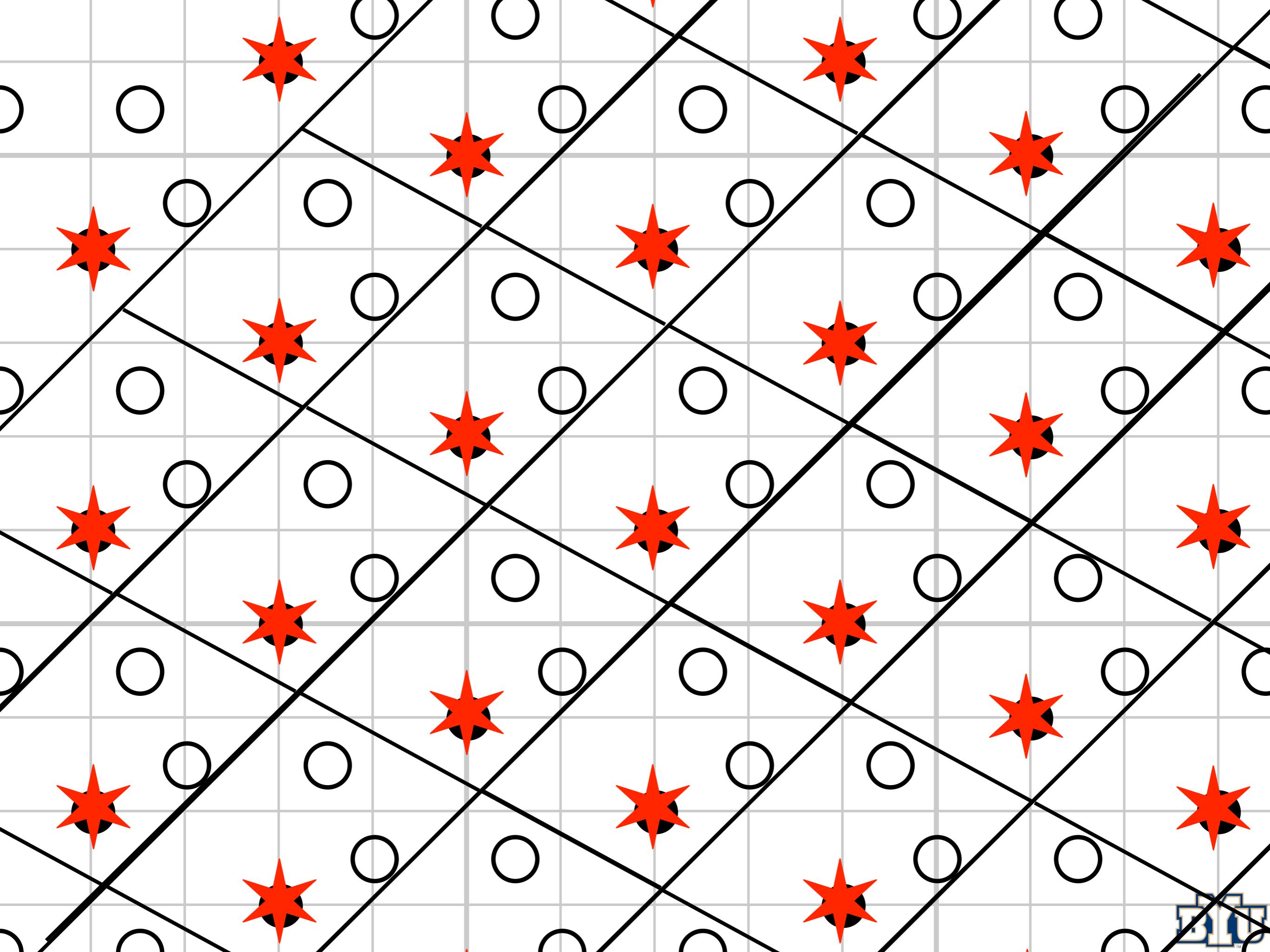
BKT



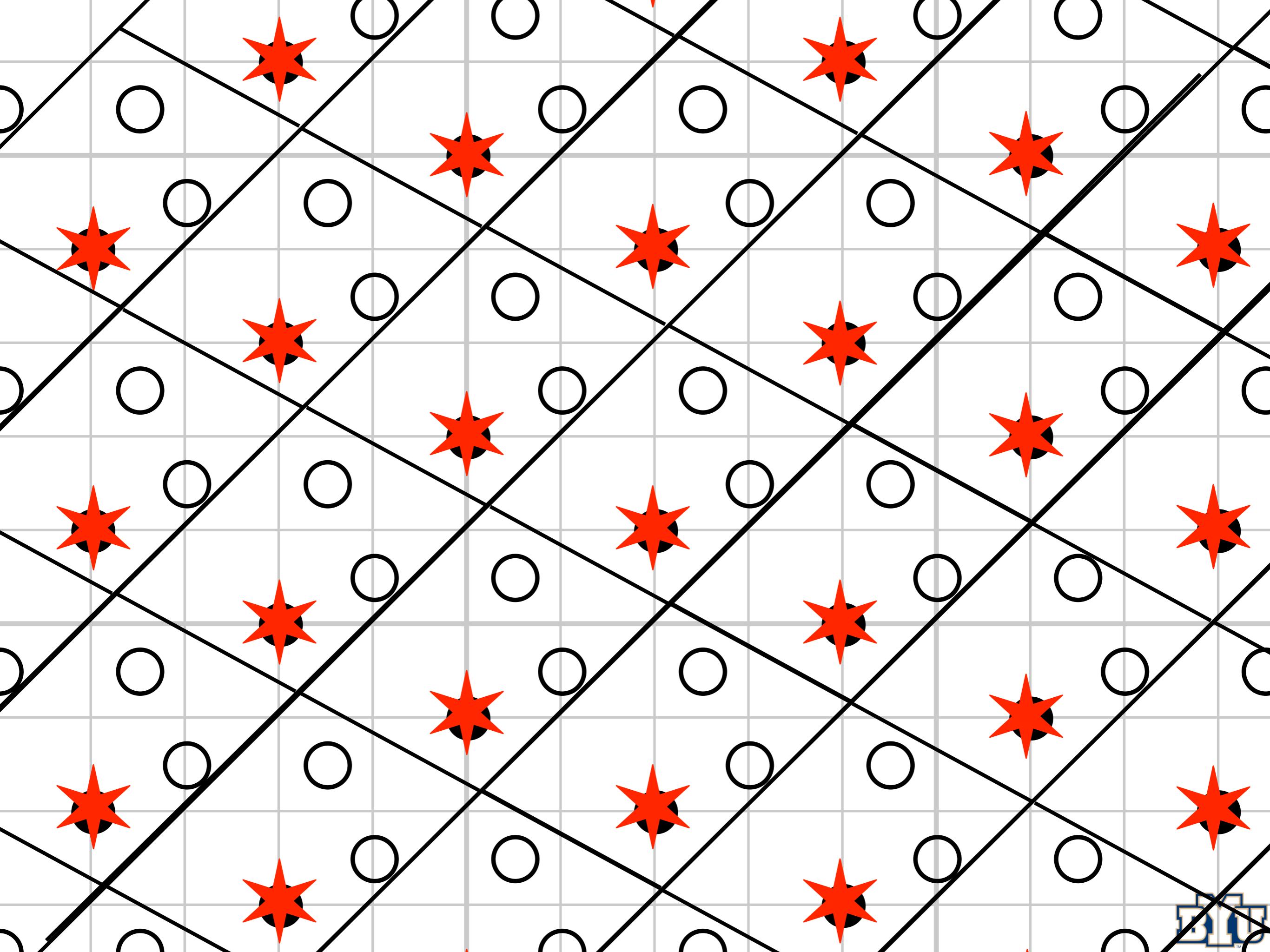
BU



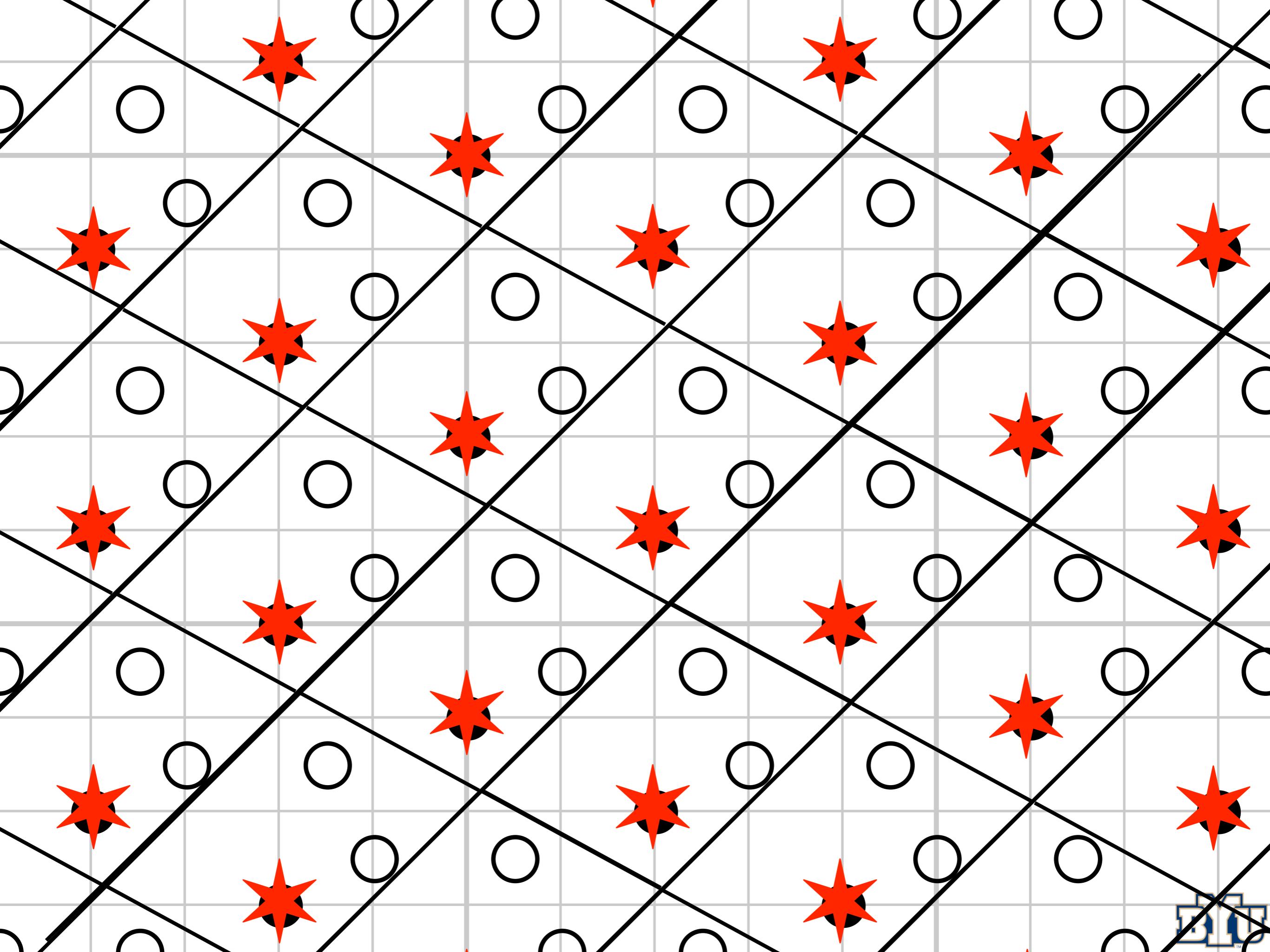
BU



BU



BU



Lattice (set of equivalent points)

• Conventional Unit Cell

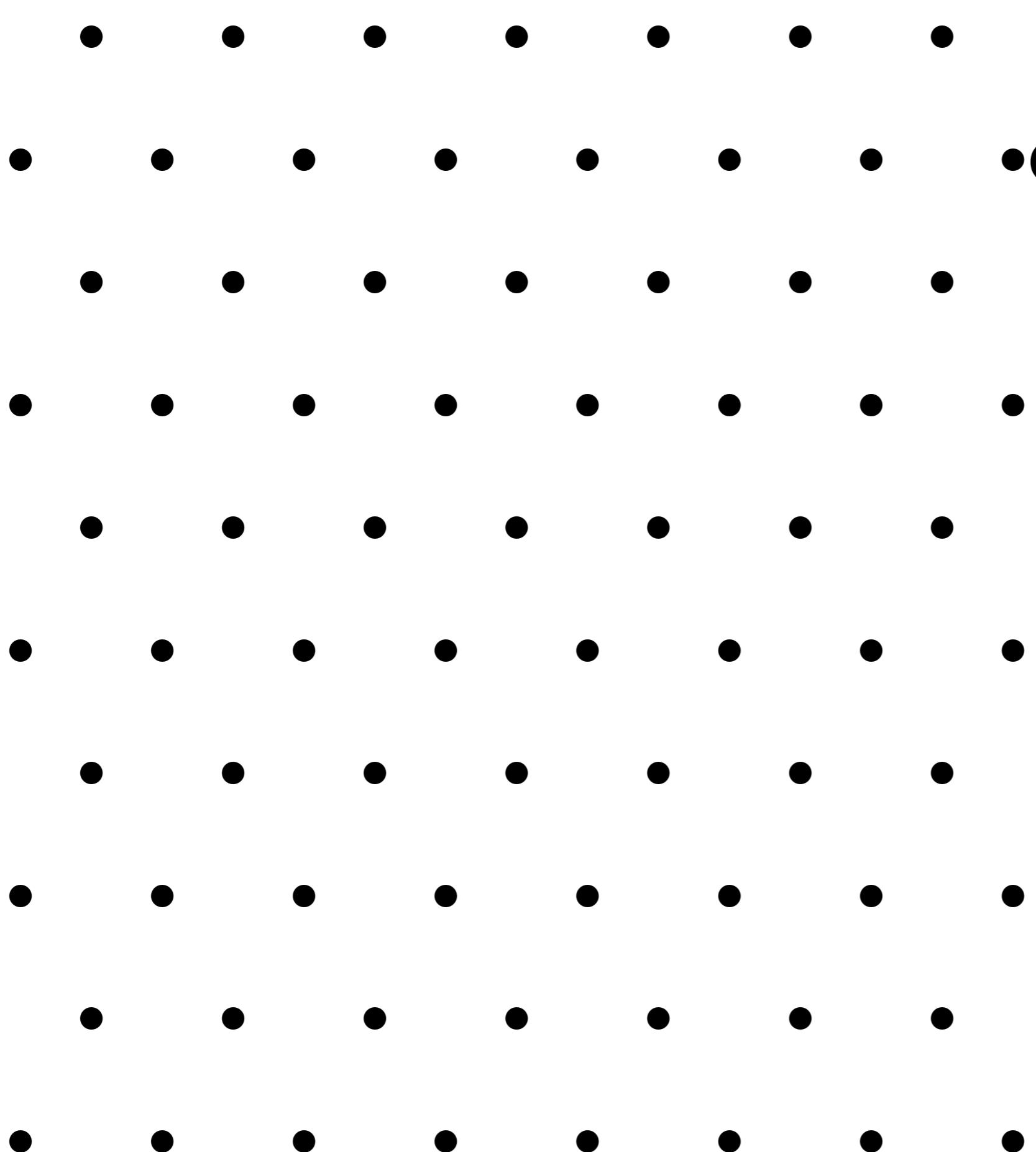
• Primitive Unit Cell

• Wigner-Seitz Unit Cell

• # atoms inside cell

• Lattice Vectors

• Atomic Basis Vectors



Lattice (set of equivalent points)

• Conventional Unit Cell

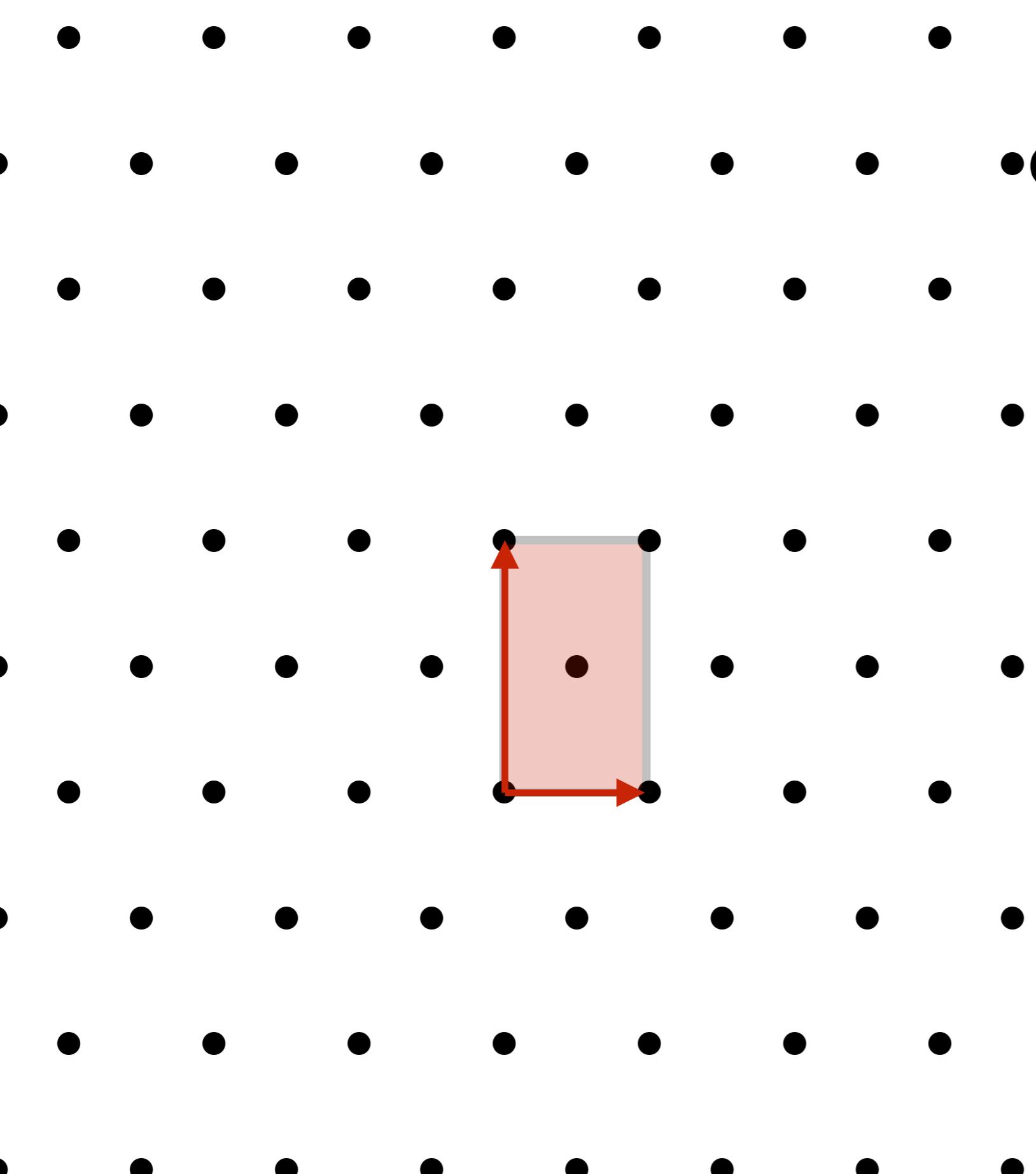
Primitive Unit Cell

Wigner-Seitz Unit Cell

atoms inside cell

Lattice Vectors

Atomic Basis Vectors



Lattice (set of equivalent points)

• Conventional Unit Cell

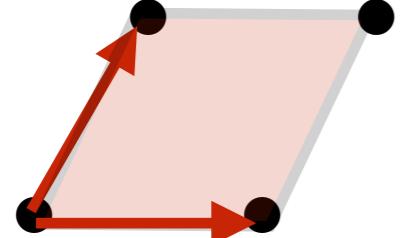
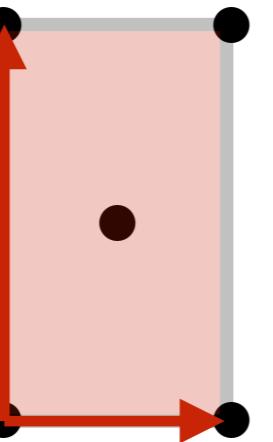
Primitive Unit Cell

Wigner-Seitz Unit Cell

atoms inside cell

Lattice Vectors

Atomic Basis Vectors



○ Lattice (set of equivalent points)

● Conventional Unit Cell

○ Primitive Unit Cell

● Wigner-Seitz Unit Cell

● # atoms inside cell

○ Lattice Vectors

● Atomic Basis Vectors

○ Lattice (set of equivalent points)

● Conventional Unit Cell

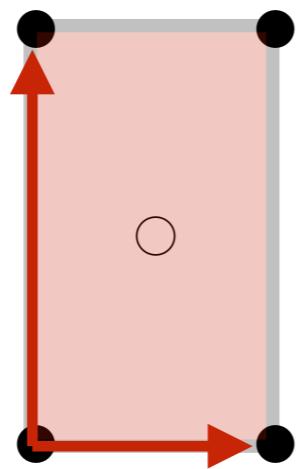
○ Primitive Unit Cell

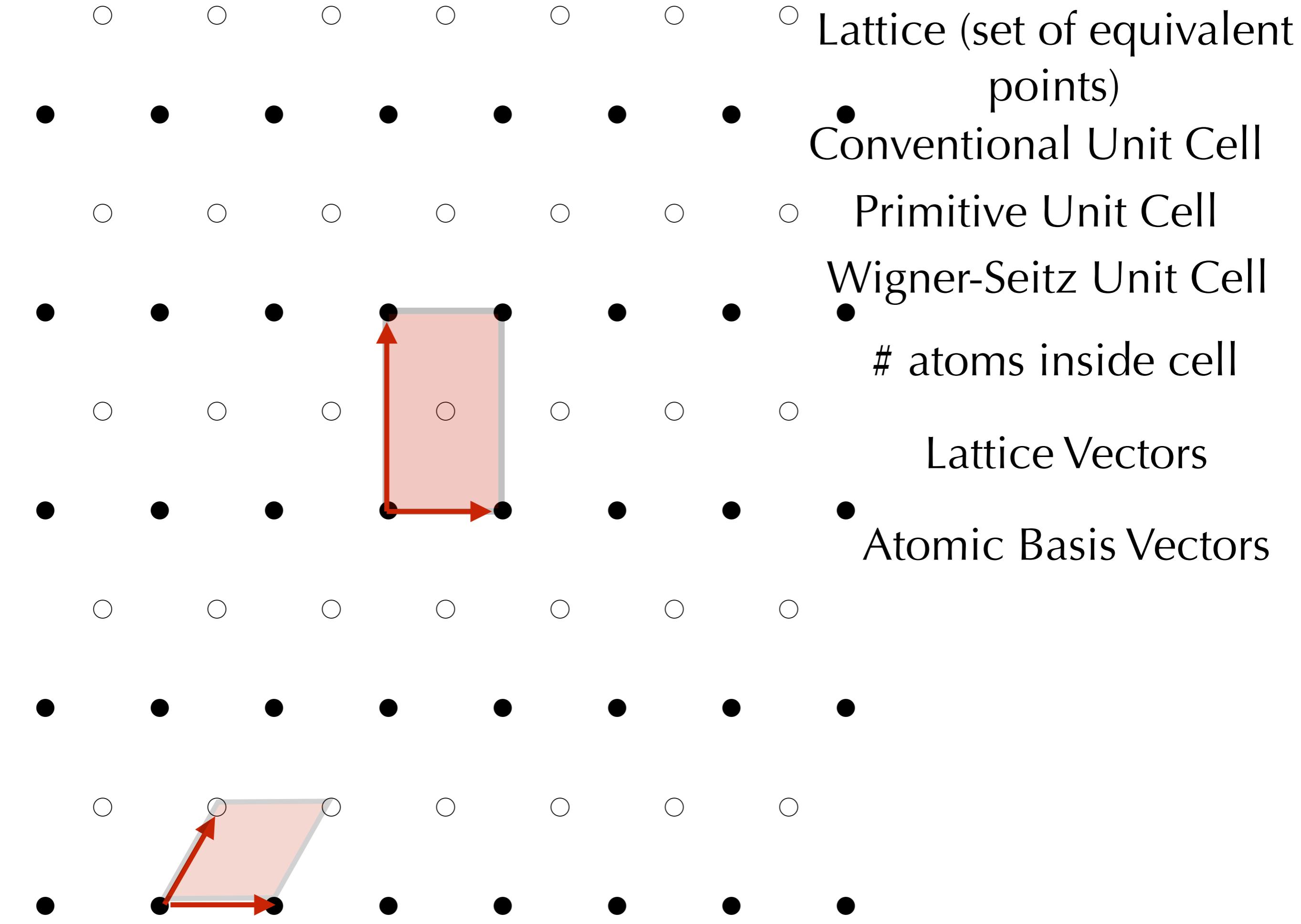
● Wigner-Seitz Unit Cell

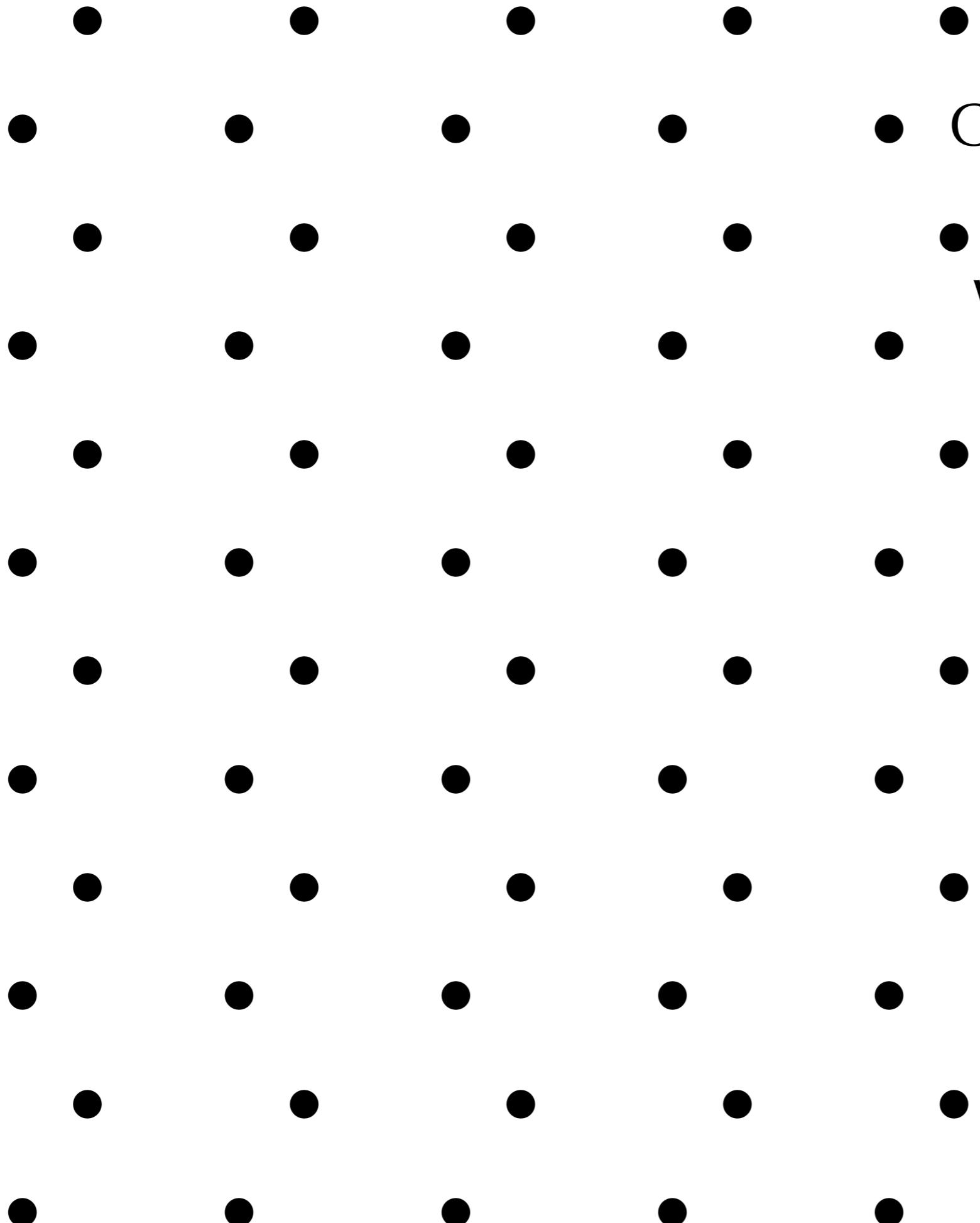
● # atoms inside cell

Lattice Vectors

● Atomic Basis Vectors





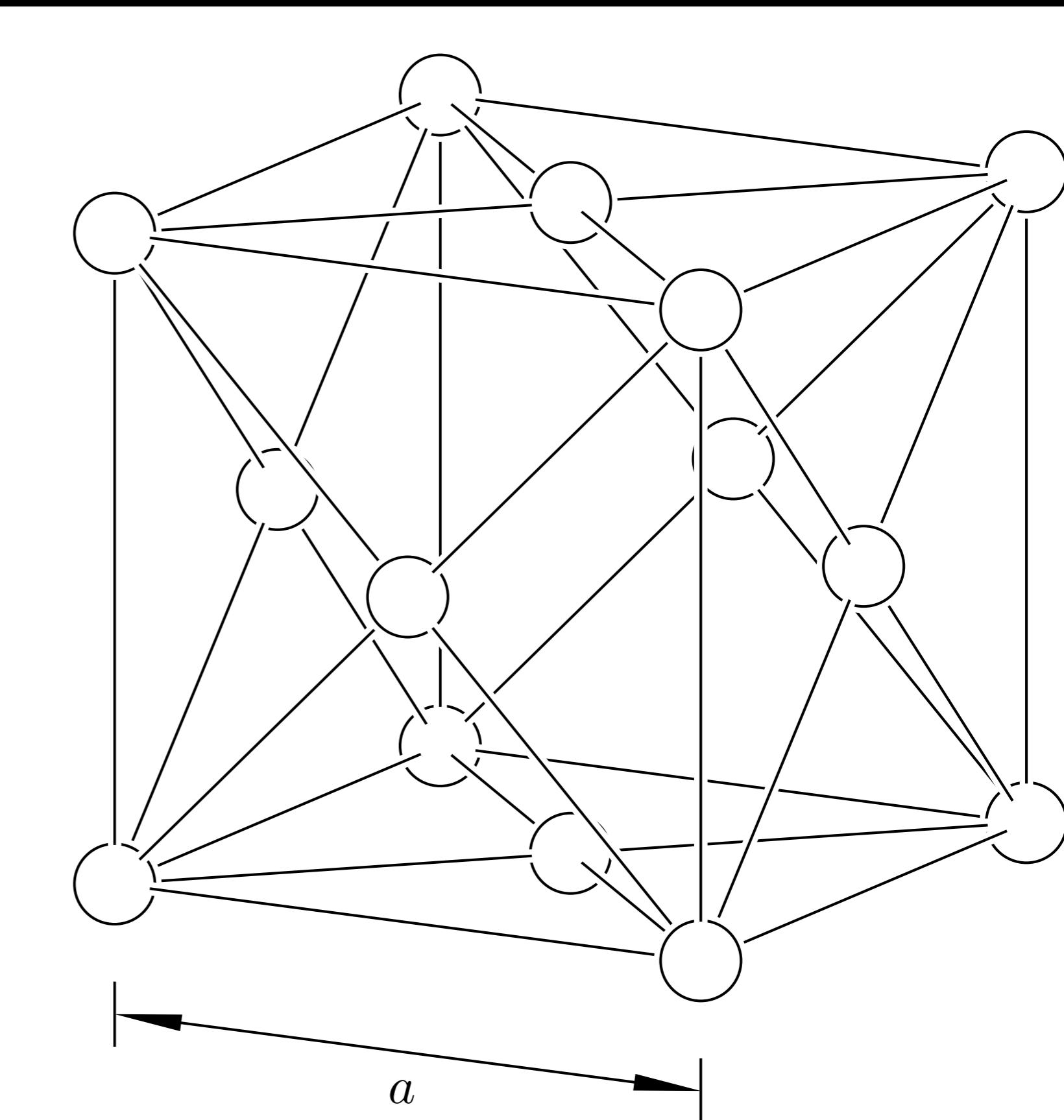


- Lattice (set of equivalent points)
- Conventional Unit Cell
- Primitive Unit Cell
- Wigner-Seitz Unit Cell
- # atoms inside cell
- Lattice Vectors
- Atomic Basis Vectors

Quiz

How many lattice points are contained in the conventional unit cell of the fcc lattice?

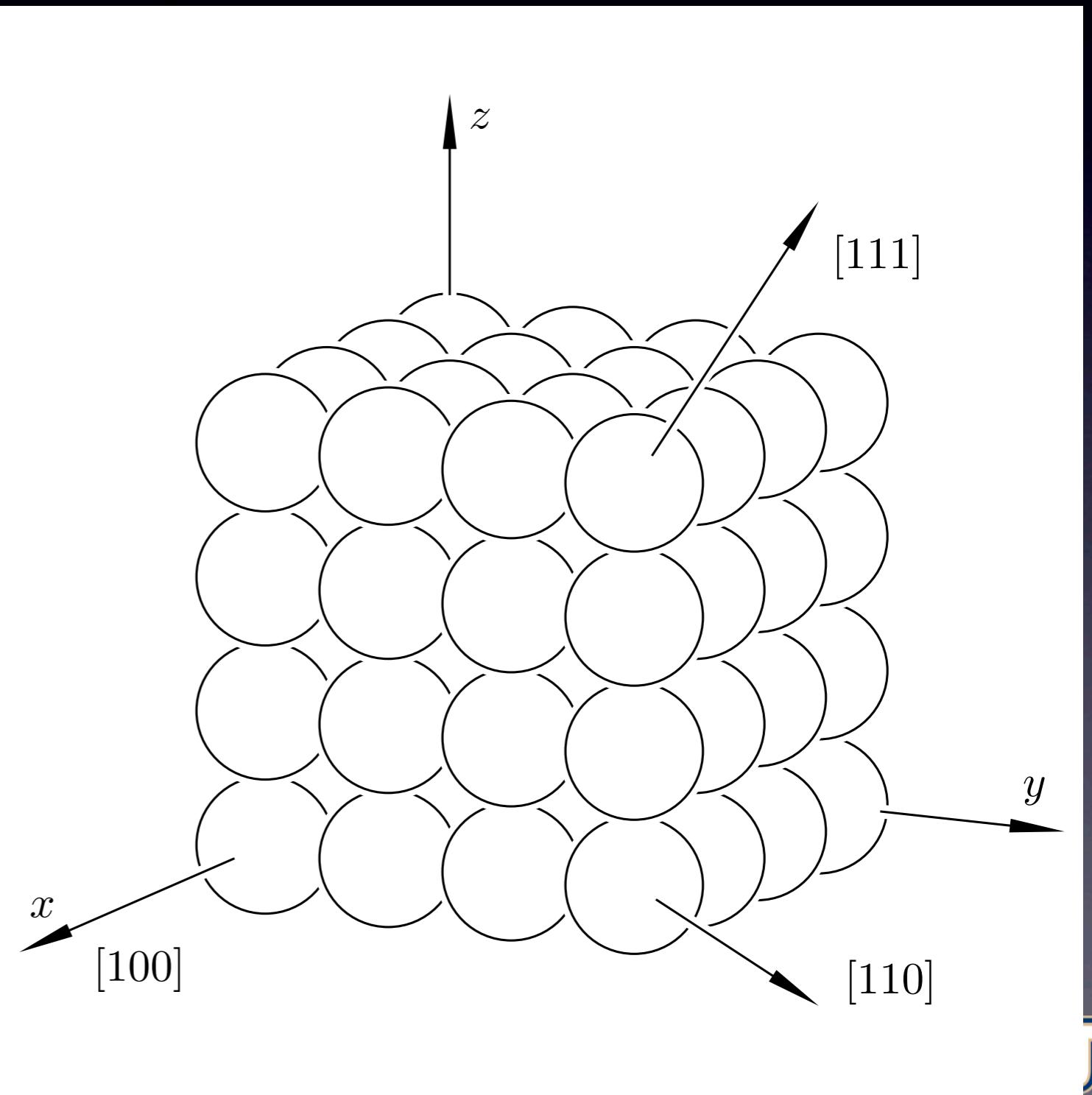
- (A) 1
- (B) 2
- (C) 4
- (D) 7
- (E) 14



Crystallographic directions

What direction is shown by the red arrow?

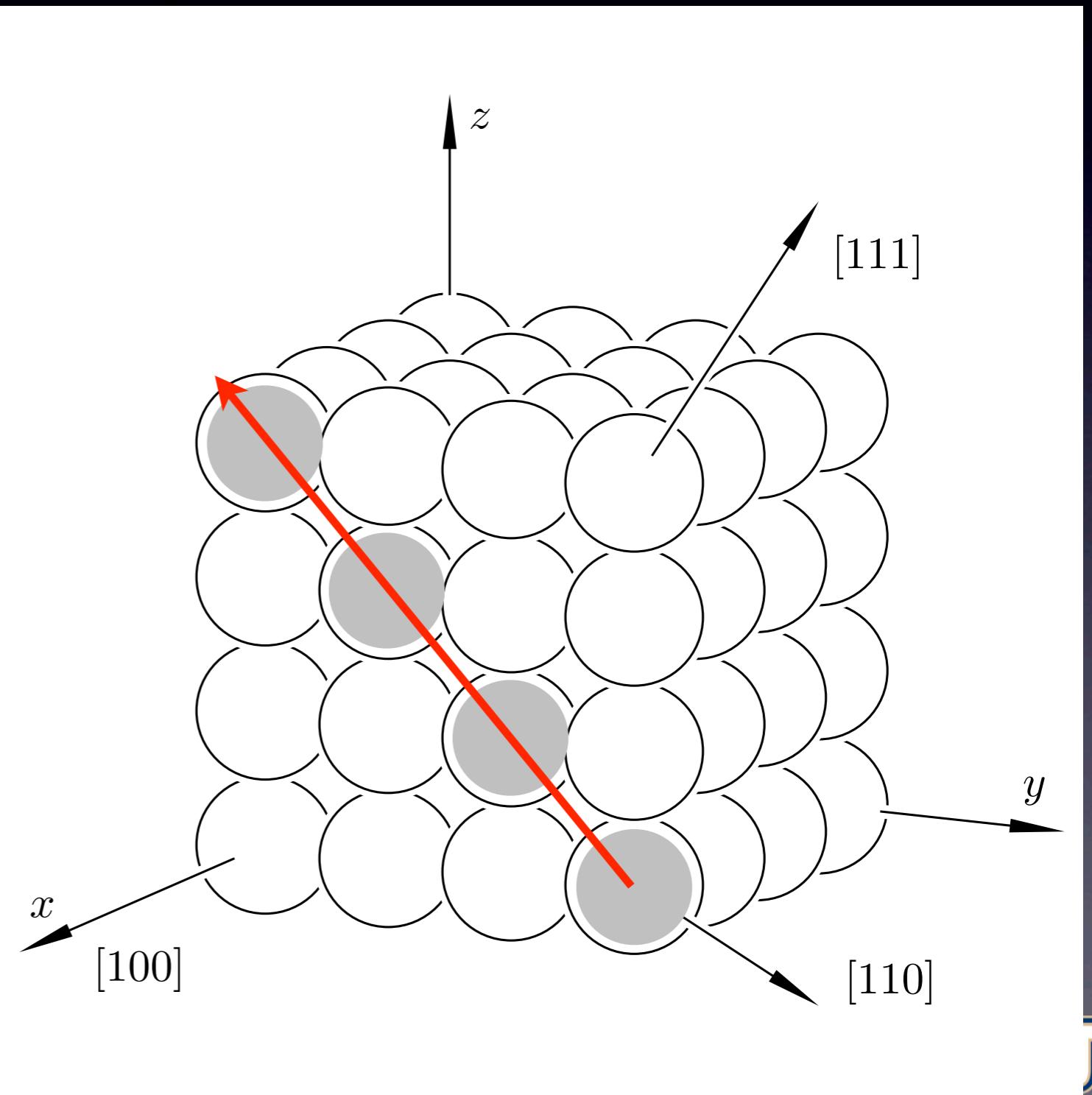
- (A) $[1\bar{1}1]$
- (B) $[\bar{1}00]$
- (C) $[101]$
- (D) $[11\bar{1}]$
- (E) $[011]$



Crystallographic directions

What direction is shown by the red arrow?

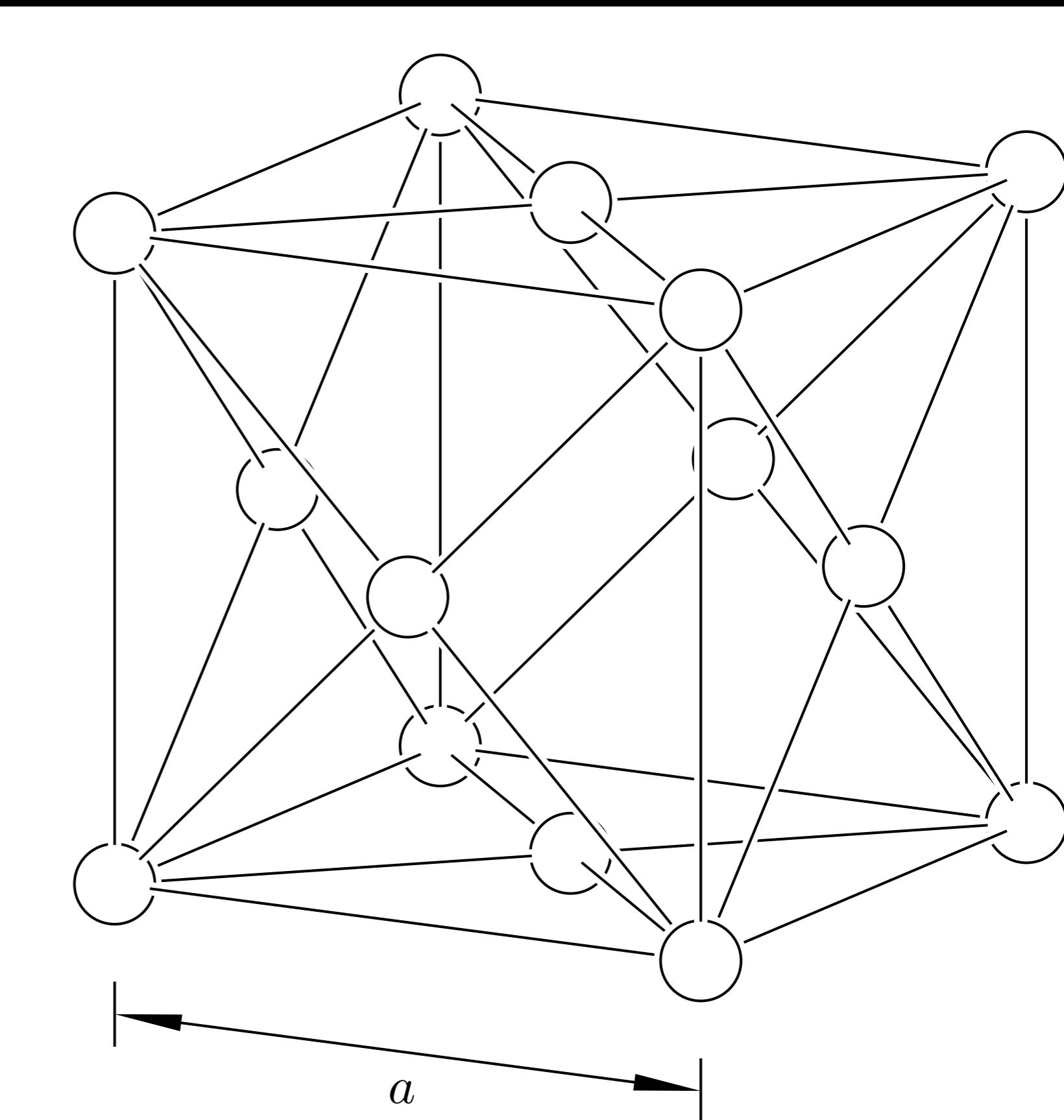
- (A) $[1\bar{1}1]$
- (B) $[\bar{1}00]$
- (C) $[101]$
- (D) $[11\bar{1}]$
- (E) $[011]$



Quiz 2-3

In an fcc lattice,
nearest neighbors occur along
which direction?

(A) [100]
(B) [110]
(C) [111]
(D) [210]
(E) None of the
above.



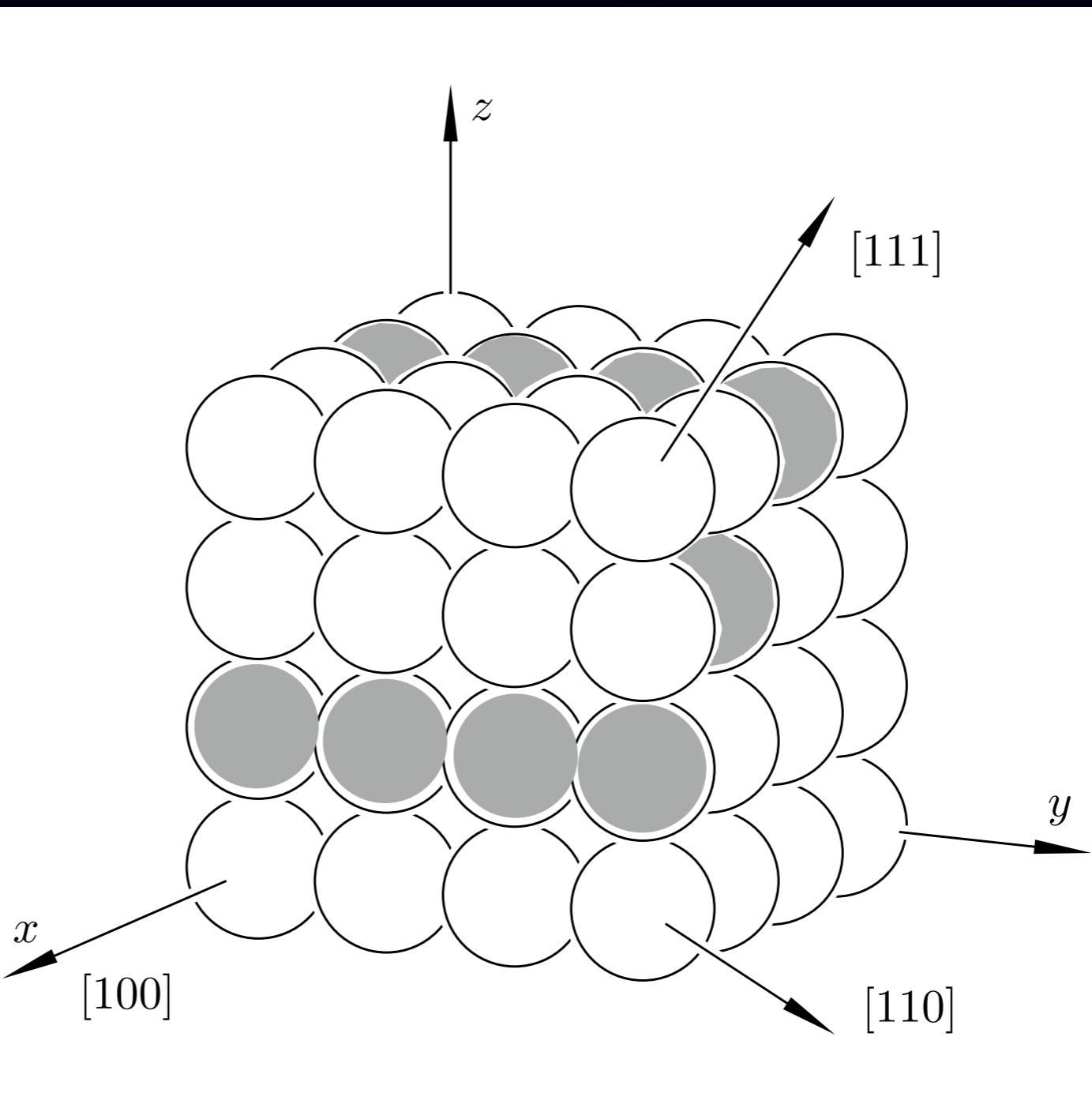
Planes: 3 numbers in ()

$(n_1 \ n_2 \ n_3)$

(100) is \perp to $[100]$

What plane is shaded in this picture?

- (A) (001)
- (B) (010)
- (C) (100)
- (D) (110)
- (E) (101)
- (F) (111)
- (G) (211)
- (H) (321)



Quiz

How many lattice points are contained in the conventional unit cell of the bcc lattice?

- (A) 1
- (B) 2
- (C) 4
- (D) 7
- (E) 14

