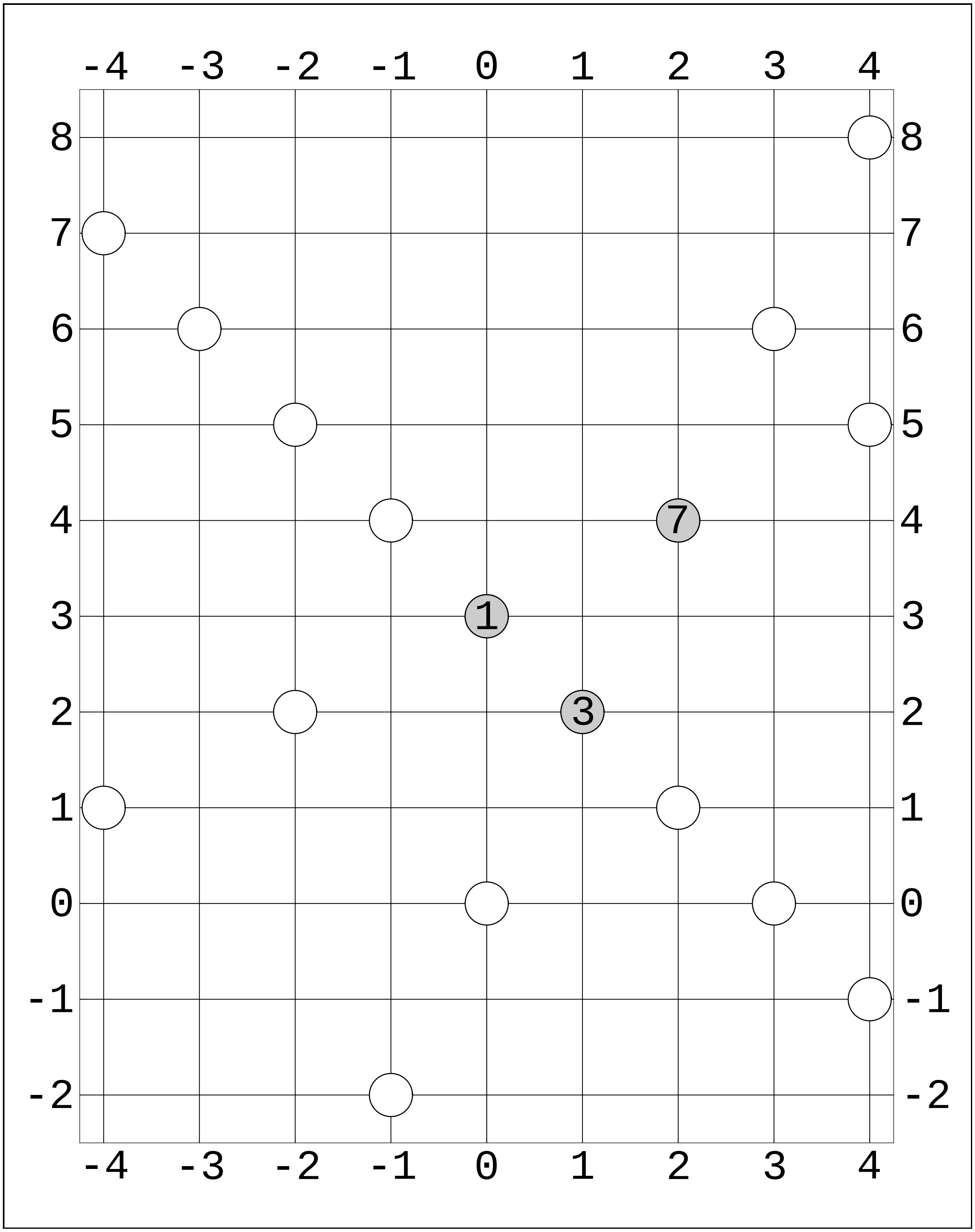
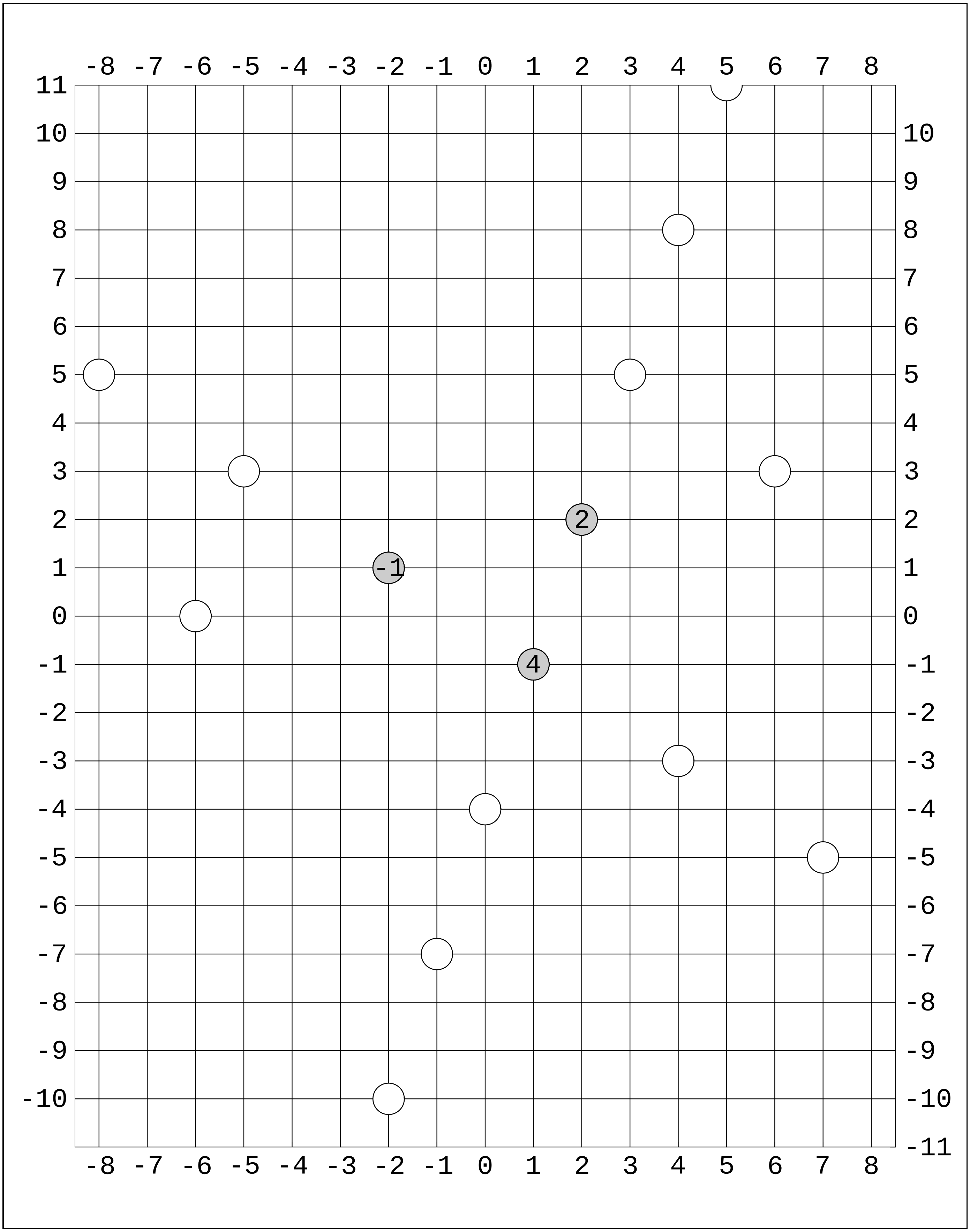
In class I stated the following problem: Given the points $(0,3,1), (1,2,3)$ and $(2,4,7)$ in a plane, find the equation of that plane. I mentioned in class that this is a more involved problem. When I said this I had in mind the sentence from the book on page 664: "An alternative method, which works for any three points, is ..." But this method that book suggests is somewhat technical. In Section 13.4 we will learn relatively easy way to solve this problem for any three points. It involves the concept of the **cross product** of two vectors in 3-space.

After class I realized that often there is a relatively easy way to find the equation of the plane even when the points do not have the same x and y coordinates. In the picture below I represent the z-value of the points $(0,3,1), (1,2,3)$ and $(2,4,7)$ by the number in a grey circle. But each pair of these points will give us the slope of the corresponding line in the given plane. Therefore we can fill in the values in all the circles in the picture below. Then it will be easy to find a pair of points that have the same x-coordinates and a pair of points that have the same y-coordinates.



Here is a similar problem which can be solved in the same way. Given the points $(1,-1,4)$, $(-2,1,-1)$ and $(2,2,2)$, find the equation of the plane containing these three points.



It turns out that we can calculate the values of z-coordinate for all the points that are on a grid of points generated by three given point. So, we are not confined to the lines through these three points. We can use all the parallel lines that go through some known points.

Here is a problem similar to the previous two, but slightly more involved. Given the points $(3,-1,4),(-2,1,-1)$ and $(1,4,2)$, find the equation of the plane which contains these three points.