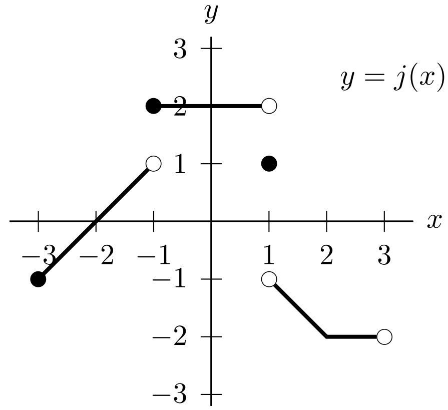
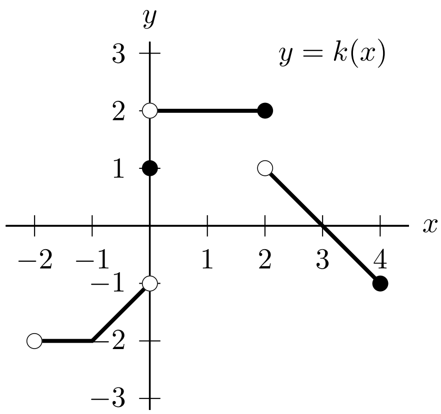
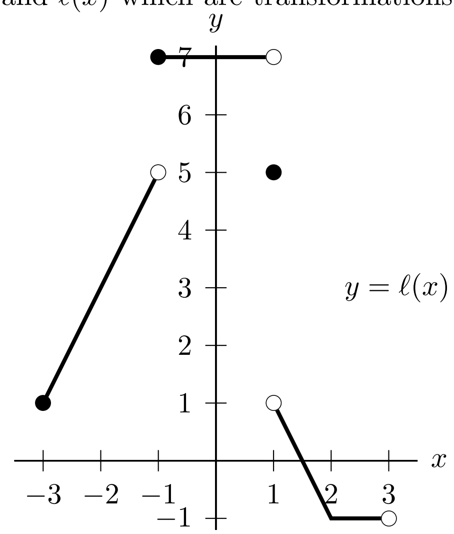
11. [6 points] Below is the graph of a function $j(x)$.



The graphs below show two other functions $k(x)$ and $\ell(x)$ which are transformations of $j(x)$. Write a formula for each in terms of j and x.





Answer: $k(x) =$ $j(-(x-1))$ and $\ell(x) =$ $2j(x)+3$

12. [3 points] Find a formula for one polynomial $p(x)$ that satisfies both of the following properties.

- The degree of $p(x)$ is at least 5.
- The domain of the function $\ln(p(x))$ is the interval $(-\infty, \infty)$.

Note that this problem may have more than one correct answer. You only need to find one correct answer.

Solution: Since the domain of $\ln(x)$ is the interval $(0,\infty)$, a number x is in the domain of $\ln(p(x))$ if and only if $p(x) > 0$. So we need to find a polynomial of degree at least 5 that is always positive. Note that any such polynomial has to have even degree (since the end behavior of an odd degree polynomial differs on the two ends). One possible answer is $p(x) = x^6 + 1$.

Answer: $p(x) =$ $x^6 + 1$