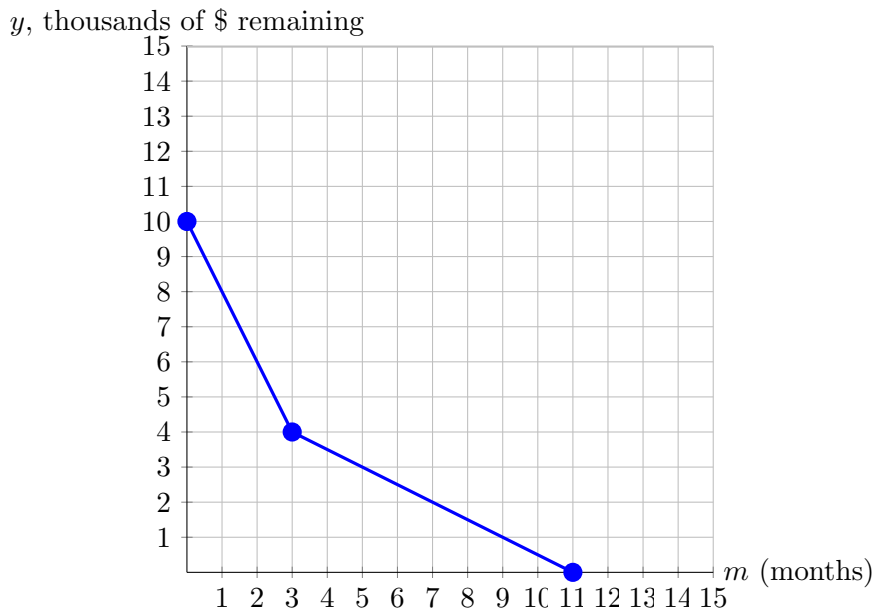


3. [10 points] Janice recently won \$10,000 through the Michigan lottery. She was so excited to have the extra spending money that she spent her winnings at a constant rate of \$2,000 per month. However, when she had \$4,000 remaining, she decided to curb her spending to make the money last, and she decreased her spending to a constant rate of \$500 per month until she spent all of her winnings. Let $W(m)$ be the remaining amount of money, in thousands of dollars, that Janice has left from her lottery winnings m months after she wins the money.
- a. [4 points] Draw a graph of your function $W(m)$. Be sure to label your axes (including units) along with any important points, including the beginning and end of different pieces of your graph.



- b. [1 point] After how many months does she spend all of her winnings?

Solution: 11 months. We can see this from the graph, or from noting that she gets to \$4000 after spending $10,000 - 6,000$, and she will spend \$6,000 after $6000/2000 = 3$ months. She will spend the remaining money in another $4000/500 = 8$ months, meaning it will all be spent after a total of $3 + 8 = 11$ months.

- c. [5 points] Find a piecewise-defined formula for $W(m)$ on the appropriate domain in the context of the problem.

Solution: For the first piece, we know that she starts with 10 thousand dollars and spends 2 thousand a month, giving us $10 - 2m$, and we found previously that this was on the interval $0 \leq m \leq 3$. After that, we know that the slope is -0.5 (thousands of dollars per month), and we know that the second part passes through the point $(3, 4)$, so we can use point-slope form to find a formula. In the previous parts, we found the domain of this piece to be $3 < m \leq 11$. (Note that we could have included the 3 in either domain, since they both give 4 as the corresponding output.)

$$W(m) = \begin{cases} \frac{10 - 2m}{-0.5(m - 3) + 4} & \text{if } \frac{0 \leq m \leq 3}{3 < m \leq 11} \end{cases}$$