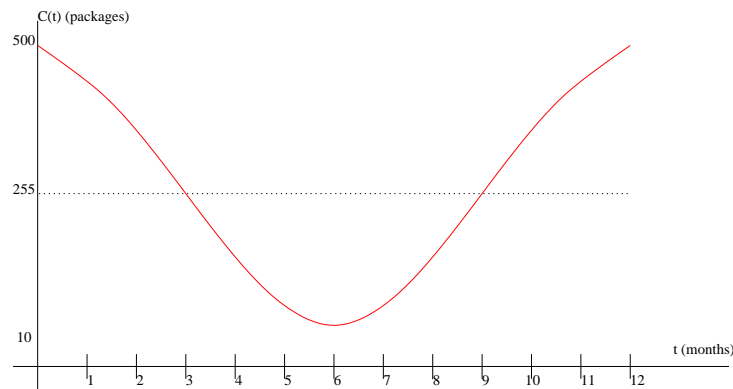


- (5.) (12 points) Americans have peculiar food allegiances. For trick-or-treat season, the empty calorie of choice is candy corn – tiny “kernels” made of sugar and food coloring. The sweet, which made its debut in the 1920s, is the top-selling non-chocolate Halloween candy in the US. Unfortunately for connoisseurs of candy corn, the supply is seasonal – it’s much easier to find candy corn in mid-October than it is in mid-April, for example.



Let  $C(t)$  be the number of bags of candy corn on the shelves of your local grocery store, where  $t$  is the number of months since mid-October. Assume that  $C$  is periodic with a period of one year, reaching a maximum of 500 bags in mid-October, and a minimum of 10 bags in mid-April (despite its virtues, candy corn is not a popular spring-season candy).

- (a) On the axes below, draw a graph of  $C$  as a function of  $t$ , in months, where  $t = 0$  represents October 15. Be sure to label your axes.



- (b) Determine a formula for  $C(t)$ .

$$C(t) = 245 \cos\left(\frac{2\pi}{12}t\right) + 255$$

- (c) Approximately what month during the year is the candy corn supply increasing the fastest?

The slope of the cosine curve is greatest three-quarters of the way through its period – in this case, when  $t = 9$ . This corresponds to nine months after mid-October, which is mid-July.