Section 3.4 – Lecture Notes/Examples

Solve the following application problems. Be sure to answer all word problems in complete sentences.

1. An all-news radio station has made a survey of the local listening habits of local residents between 5pm and midnight. The survey indicates the percentage of local adult population that is tuned in to the station \( x \) hours after 5:00pm is modeled by the function
   \[ f(x) = \frac{1}{8}(-2x^3 + 27x^2 - 108x + 240). \]
   a. At what time between 5pm and midnight are the most people listening? What percentage of the population is listening at this time?
   b. At what time are the fewest people listening? What percentage of the population is listening at this time?

2. A poll indicates that \( x \) months after a particular candidate declares her candidacy, she will have the support of \( s(x) \) percent of the voters, where
   \[ s(x) = \frac{1}{29}(-x^3 + 6x^2 + 63x + 1080) \quad \text{for} \quad 0 \leq x \leq 12 \]
   a. If the election is held in November, when should she announce her candidacy?
   b. Find the max percentage of voter support?
   c. Should she expect to win if she needs at least 50% of the vote?