**3.** [16 points] Suppose the graph below shows the rate of snow melt and snowfall on Mount Arvon, the highest peak in Michigan (at a towering 1970 ft), during a day (24 hour period) in April of last year. The function $m(t)$ (the solid curve) is the rate of snow melt, in inches per hour, t hours after the beginning of the day. The function $p(t)$ (the dashed curve) is the snowfall rate in inches per hour t hours after beginning of the day. There were 18 inches of snow on the ground at the beginning of the day.
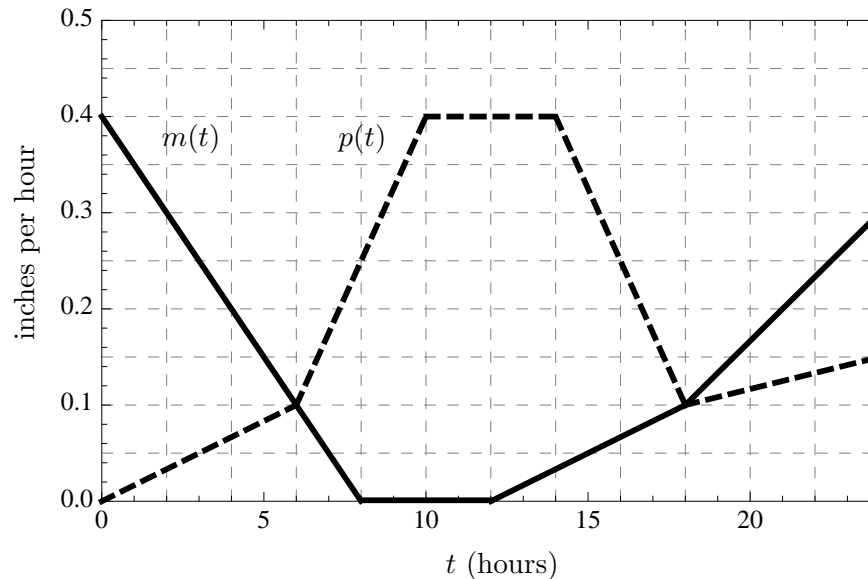
a. [2 points] Over what time period(s) was the snowfall rate greater than the snow melt rate?

b. [2 points] When was the amount of snow on Mount Arvon increasing the fastest? When was it decreasing the fastest?

c. [3 points] When was the amount of snow on Mount Arvon the greatest? Explain.

d. [3 points] How much snow was there on Mount Arvon at the end of the day (at $t = 24$)? Show work.

3. (continued)

   e. [6 points] The graph of $p(t)$ is repeated below. On the empty set of axes, sketch a well-labeled graph of $P(t)$, an antiderivative of $p(t)$ satisfying $P(0) = 0$. Label and give the coordinates of the points on the graph of $P(t)$ at $t = 10$ and $t = 18$.