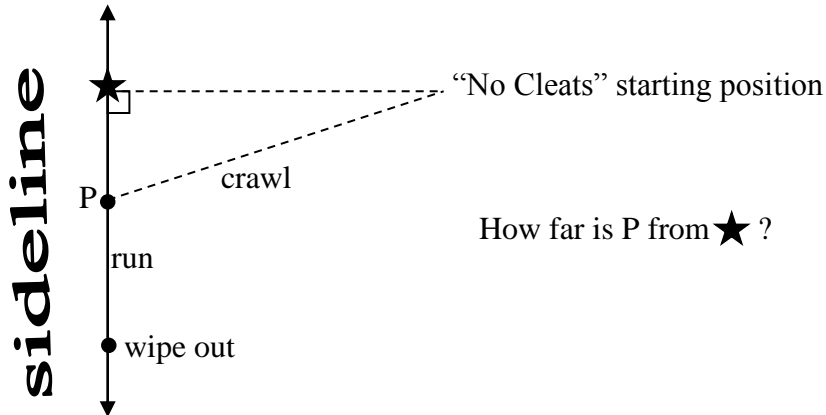


## Optimization Problems

1. \*100 feet of wire will be used to enclose a rectangular area. What are the dimensions of the rectangle of the largest area?
  
2. \*An apple orchard contains 30 trees per acre, each with an average yield of 400 apples. For each additional tree planted, the yield of each tree decreases by 10 apples. How many tree per acre will maximize the crop?
  
3. A closed cylinder (has a top and bottom) is made of a fixed amount of material,  $m$ . What are the dimensions of a cylinder made from this amount of material which will possess maximum volume?
  
4. You own 10,000 pounds of lettuce worth \$0.16 per pound. It's value increases \$0.1 per pound each week while in storage, but storage costs you \$60 per week and 100 pounds spoils each week and must be discarded. When do you sell to maximize profit?
  
5. \*Find the dimensions of an open box made from minimum amount of material if the bottom is a square and its volume must be 4 cubic feet (an open top box has a bottom but no top)
  
6. \*Find the number that exceeds its square by the greatest amount.
  
7. \*Find the point on the parabola  $f(x) = x^2$  that is closest to the point  $(6, 3)$ .
  
8. \*A 20" by 20" copper sheet is formed into an open box by cutting squares from the corners and folding the tabs upward. What are the dimensions of the box of greatest volume?

9. Dirk “No Cleats” Granite, a punt returner for the Amelia Barons, begins to return a punt but slips and stumbles 6 yards from the sideline. A fellow Baron, “No Nose” Nayburn, tosses “No Cleats” his graphing calculator and “No Cleats” determines that he can make it to a spot 12 yards farther down the sideline before 8 Trojans wipe him out (Blocking is not one of the Baron’s strengths). Being the considerate player that he is, and not wanting to waste any time, “No Cleats” wishes to be gang tackled in the least amount of time. If “No Cleats” can run at 10 yards per second (wow!) AND can “bear crawl” (knees can’t touch) at 4 yards per second AND he will bear crawl to the sideline before standing and running; towards what sideline point (how far from ★ in the sketch) should he crawl?

Sketch:



10. If tickets cost \$0.50, 10,000 people will attend “No Cleats” game. For each \$0.05 ticket price increase 200 fewer people will attend (cheap town). Find the ticket price that yields maximum income.