F-LE Algae Blooms

Task

Algal blooms routinely threaten the health of the Chesapeake Bay. Phosphate compounds supply a rich source of nutrients for the algae, *Prorocentrum minimum*, responsible for particularly harmful spring blooms known as mahogany tides. These compounds are found in fertilizers used by farmers and find their way into the Bay with run-offs resulting from rainstorms. Favorable conditions result in rapid algae growth ranging anywhere from 0.144 to 2.885 cell divisions per day. Algae concentrations are measured and reported in terms of cells per milliliter (cells/ml). Concentrations in excess of 3,000 cells/ml constitute a bloom.

a. Suppose that heavy spring rains followed by sunny days create conditions that support 1 cell division per day and that prior to the rains *Prorocentrum minimum* concentrations measured just 10 cells/ml. Write an equation for a function that models the relationship between the algae concentration and the number of days since the algae began to divide at the rate of 1 cell division per day.

b. Assuming this rate of cell divison is sustained for 10 days, present the resulting algae concentrations over that period in a table. Did these conditions result in a bloom?

c. If conditions support 2 cell divisions per day, when will these conditions result in a bloom?

d. Concentrations in excess of 200,000 cells/ml have been reported in the Bay. Assuming the same conditions as in (c), when will concentrations exceed 200,000 cells/ml?