

9. [7 points] The air in a factory is being filtered so that the quantity of a pollutant,  $P$  (in mg/liter), is decreasing exponentially. Suppose  $t$  is the time in hours since the factory began filtering the air. Also assume 20% of the pollutant is removed in the first five hours.

a. [2 points] What percentage of the pollutant is left after 10 hours?

b. [5 points] How long is it before the pollution is reduced by 50%?

10. [5 points] Define a function

$$f(x) = \begin{cases} \frac{-x^3 + 5x^2}{x - 5} & x \neq 5, \\ k & x = 5. \end{cases}$$

a. [3 points] Find a value of  $k$  so that  $f(x)$  is a continuous function for all real numbers  $x$ .

b. [2 points] For the value of  $k$  you found, is  $f(x)$  differentiable at  $x = 5$ ? Briefly explain.