

1. A chemist is studying an interesting reaction, and wants to better understand the heat produced for safety reasons. The heat as a function of time is given by

$$H(t) = (x^3 - 10x^2 + 18x)e^{-x}$$

The reaction runs for at most ten hours. Construct a critical point and sign chart to classify all the minima and maxima of the reaction. Hint: one of the factors of the cubic you get when looking for critical points is 9. Long divide then use the quadratic equation. Or use a computer calculator :)

2. A colony of penguins is planning to build a new town wall. The wall will be in the shape of a rectangle with a triangle on top. The angle of the triangle is 90 degrees, and the back of the wall will abut a glacier, so they do not need to put a wall along there. If the penguins have 1000 feet of material for their wall, how much area can they enclose?