10. (11 points) Hiking through the forest you come upon a cave. As you stand outside the cave and peer in, a bat flies out towards you before veering off into the forest. The bat’s path is given in the figure below where the origin represents where you are standing. The distance \( l \) represents the distance between you and the bat. Everything is measured in feet.

\[
\begin{align*}
\text{y} & \quad \text{(Bat’s path)} \\
\end{align*}
\]

\[f(x) = \text{Bat’s path}\]

(a) Find a formula for \( l^2 \) in terms of \( x \) and \( f(x) \).

(b) Let \( D = l^2 \) and find \( \frac{dD}{dx} \).

(c) The minimum distance between you and the bat occurs when \( D \) is minimized. Find the value of \( x \) at this point in terms of \( f(x) \) and \( f'(x) \).

Continued on the next page!
(d) Suppose $f(x) = e^{x+3}$. If a bat comes with 5 feet of you, a panic attack will occur. (Remember that the distance between you and the bat is $l$, not $D$!) Did the bat induce a panic attack? [Hint: You are encouraged to use your calculator here!]