1. If $f(x)$ is increasing, then $f'(x)$ is ________.
2. $f'(x)$ is negative if $f(x)$ is ________.
3. $f''(x)$ is positive if $f(x)$ is ________.
4. $f''(x)$ is negative if $f'(x)$ is ________.
5. If $f(x)$ is concave down, then $f''(x)$ is ________.
6. If $f'(x)$ is increasing, then $f''(x)$ is ________.
7. If $f'(x)$ is decreasing, then $f(x)$ is ________.
8. If $f'(x) > 0$ and $f''(x) < 0$, then $f(x)$ looks like ________.
9. If $f(x)$ is an exponential decay curve, then $f'(x)$ is ________ and ________.
10. If $f(x)$ has an inflection point, then $f(x)$ has a change in ________.
11. If $f(x)$ has a horizontal tangent, then $f'(x)$ has a ________.
12. If $f'(a) = 0$, then $f(x)$ has a ________ at $x = a$.
13. If $f''(x)$ has a change of sign and is always defined, then $f(x)$ has either a ________ or ________.
14. If $f(x)$ has a corner at $x = a$, then $f'(a)$ is ________ ________.
15. If $f''(x) = 0$ for all values of $x$, then $f(x)$ is ________.
16. If $f''(x) = 0$ for all values of $x$, then $f(x)$ is ________ ________.
17. If $f'(a) = 2$ and $g(x) = f(x) - 5$, then $g'(a) =$ ________.
18. If $f(x)$ is concave down everywhere, then $-f''(x)$ is ________ ________ ________.
An exponential decay curve looks like this:

\[ f(t) = P_0 e^{-kt} \]

Sketch of derivative

\[ y = f'(t) \]

It is clear from the graph that \( f \) is decreasing (i.e., \( f' \) is negative). It is also clear that the slope for \( t < 0 \) is a large negative number. As \( t \to \infty \), this negative number approaches zero. Hence \( f' \) is increasing.

\[
\begin{align*}
  g'(a) &= \lim_{h \to 0} \frac{g(a+h) - g(a)}{h} \\
        &= \lim_{h \to 0} \frac{f(a+h) - f(a)}{h} \\
        &= f'(a) \\
        &= 2
\end{align*}
\]

#13 If \( f' \) changes sign, then either:

i) \( f \) goes from increasing to decreasing
   or maximum

ii) \( f \) goes from decreasing to increasing minimum