1. (14 points) Problems (a), (b) and (c) below are independent of each other.

(a) (5 pts.) Compute the linear approximation to \( g(x) = 3 \ln(x^2) \) near \( x = 1 \).

(b) (3 pts.) Write the limit definition of the derivative of the function \( f(x) = e^x - e^{-x} \) at the point \( x = a \). You do not need to simplify or attempt to compute the limit.

(c) (6 pts.) Assuming the following table accurately represents the behavior of the continuous function \( s(x) \) over the interval \([0, 12]\), approximate the following:

\[ \text{[NOTE: the values in the table are for } s'(x), \text{ not } s(x)]. \]

\[
\begin{array}{c|cccc}
  x & 0 & 3 & 6 & 10 & 12 \\
  s'(x) & -6 & -3 & 0 & 1.2 & 17 \\
\end{array}
\]

(i) \( s''(3) \)

(ii) All intervals in \([0, 12]\) (if any) over which \( s \) is decreasing.

(iii) All intervals in \([0, 12]\) (if any) over which \( s \) is concave down.