7. (15 points) Let g be the function that is defined for $x > 1$ by

$$g(x) = \int_3^x \frac{t}{\ln t}\, dt.$$

(a) Find $g'(x)$.

(b) On which subinterval(s) of $x > 1$, if any, is g increasing? Briefly explain the reason for your answer.

(c) On which subinterval(s) of $x > 1$, if any, is g concave up? Briefly explain the reason for your answer.

(d) Fill in the blanks with one of the words "positive", "negative", or "zero", to make the following sentences true. (Any word may be used more than once. No explanation necessary.)

$g(4)$ is _____.

$g(3)$ is _____.

$g(2)$ is _____.