

7. (9 points) Let  $f$  be a function that is positive, decreasing, and concave down for  $1 < x < 2$ . Let  $g$  be the function defined by  $g(x) = 1/f(x)$ . Use the methods of calculus to show why the statements in (a) and (b) are true.

(a)  $g$  is increasing for  $1 < x < 2$ .

(b)  $g$  is concave up for  $1 < x < 2$ .

(c) If  $f$  is positive, decreasing, and *concave up* for  $1 < x < 2$ , is  $g(x) = 1/f(x)$  always increasing and concave down for  $1 < x < 2$ ? Explain why or why not.