#88. 
\[ f(g(x)) = x \Rightarrow f'(g(x))g'(x) = 1 \Rightarrow g'(x) = \frac{1}{f'(g(x))} \]

Since \( f'(x) = 1 + (f(x))^2 \),

\[ g'(x) = \frac{1}{(1 + (f(g(x)))^2)} = \frac{1}{1 + x^2} \]

\( f'(g(x)) = x \)

#4
AM at e,
Am at t,
LM at c, e, and s
Lm at b, c, d, and r
Neither a max nor a min at a.

#46. \( f(x) = x^3 - 3x + 1 \), \([0,3]\)
\[ f'(x) = 3x^2 - 3 = 3(x+1)(x-1) = 0 \]
\( \Rightarrow x = \pm 1 \)

\( f(0) = 1 \)
\( f(-1) = -1 + 3 + 1 = 3 \)
\( f(3) = 3^3 - 3^2 + 1 = 19 \)
\( f(1) = 1 - 3 + 1 = -1 \)

AM value is 19 at \( x = 3 \)
AM value is -1 at \( x = -1 \)

#52. \( f(x) = \frac{x^2 - 4}{x^2 + 4} \), \([-4,4]\)
\[ f'(x) = \frac{2x(x^2 + 4) - (x^2 - 4) \cdot 2x}{(x^2 + 4)^2} \]
\[ = \frac{2x \cdot 8}{(x^2 + 4)^2} = 0 \]
\( \Rightarrow x = 0 \)

AM value is \( \frac{3}{5} \) at \( x = \pm 4 \)
AM value is -1 at \( x = 0 \)

#69. \( f(x) = x^{101} + x^{51} + x + 1 \)
\[ f'(x) = 101 \cdot x^{100} + 51 \cdot x^{50} + 1 \geq 1 \], for all \( x \).
So \( f'(x) = 0 \) has no solution i.e. \( f(x) \) has neither a LM nor a Lm.