3.86

$p(0) = a_0 = 4$

$p(2) = 2 = 8a_3 + 4a_2 + 2a_1 + a_0 \rightarrow a_1 = -1 - 4a_3 - 2a_2$

$p(1) = 0 = a_3 + a_2 + a_1 + a_0 \rightarrow 0 = -3a_3 - a_2 + 3$

$a_2 = 3 - 3a_3$

$p'(x) = 3a_3x^2 + 2a_2x + a_1$

$p'(1) = 0 = 3a_3 + 2a_2 + a_1 \rightarrow 0 = 3a_3 + 6 - 6a_3 - 1 - 4a_3 - 2a_2$

$0 = -7a_3 + 5 - 6 + 6a_3$

$a_0 = 4$ , $a_1 = -9$, $a_2 = 6$ $\leftarrow$ $\boxed{a_3 = -1}$