Quiz 1

January 15, 2016

In t minutes, the heat of iron in a controlled environment will be increasing at a rate of $H'(t) = \dfrac{t^2}{10(t+1)}$ degrees per minute. How much does the temperature increase in the first 15 minutes? (Round your answer to two decimal places.)

$\longrightarrow$ what is $H(15) - H(0)$?

$H(15) - H(0) = \displaystyle\int_0^{15} H'(t)\,dt$

$= \displaystyle\int_0^{15} \dfrac{t^2}{10(t+1)}\,dt$

$u = t+1 \longrightarrow t = u-1 \longrightarrow t^2 = u^2 - 2u + 1$

$du = dt$

$= \displaystyle\int_1^{16} \dfrac{u^2 - 2u + 1}{10u}\,du$

$= \dfrac{1}{10}\displaystyle\int_1^{16} u - 2 + \dfrac{1}{u}\,du$

$= \dfrac{1}{10}\left[\dfrac{1}{2}u^2 - 2u + \ln|u|\right]_1^{16} = \boxed{10.03}$