ME 328 – Machine Design

This exam is MY work, and my work ONLY:

Quiz 4a– Closed book, closed notes, NO calculator

March 11, 2020

Signature:

This quiz is 5 points (1/2 the normal so far)

Print name:

For full credit, you must show units at every step and show variable form of equations before inserting values. Values must <u>include units at every step</u>. Since you do not have a calculator, you do not need to calculate the answer, but solve it symbolically (with variables only) and then include appropriate numbers so that if you had a calculator it would be a matter of simple number crunching. If you don't have values for all parameters, leave them as variables in your final equation. If you cannot calculate answers with the information provided in this exam, explain why and/or what information would be required.

Equations:

$$\delta_{max} = \delta_{st}\, K \quad P = WK \quad K = \{ 1 + (1 + 2h/\delta_{st})^{1/2}\}, \; PE = mgh, \; KE = \tfrac{1}{2}\, mv^2, \; E = \tfrac{1}{2}\, kx^2;$$
$$E = \int F\, dx$$

Given an off-road vehicle going over a jump, when it lands, the displacement is shown below. If the damping factor was reduced slightly (ζ<1), but the mass and spring remained constant, sketch on the graph below the anticipated displacement. Circle and very briefly discuss three aspects of your graph that differ compared to the graph provided (ζ=1).

displacement (damping factor = 1)