

SDSU ME314 Spring 2015: Homework 1 Due Thu Feb 12, 2015 at 11:59pm

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1 Introduction

This is the first assignment for ME314. This assignment will consist of a series of problems to solve. You will have a separate set of projects associated with this class, so we will not make the problem assignments overly demanding, but they will be useful for your learning.

You will turn this assignment in on blackboard via turnitin and we will go through it in class the second lecture after you turn it in.

2 Readings

As soon as you get the book, please read chapters 1-4, which is what we have been lecturing on. In fact, we have skipped most of chapter 3, but will be going back to it, so please read 1-4.

3 Problems

3.1 Problem 1: Definitions

Define in your own words the following terms:

1. Design
2. Engineering Design
3. Machine
4. Mechanical Component
5. Factor of Safety
6. The reliability approach to design

3.2 Problem 2: Statistics

3.2.1 Equation

Write down the equation for the normal distribution

3.2.2 What does this equation tell you (what is it computing)?

3.2.3 Calculations

If the mean of the density for a particular material is listed as $3.3\text{kg}/\text{m}^3$, and the standard deviation of that value is $0.5\text{kg}/\text{m}^3$, what value of density should be used to ensure that, if there is uncertainty in the mass properties for a particular sample of that metal, you are 99% sure that the density will be equal to or greater than that number?

3.2.4 Graph

Use matlab (or freemat, or octave) and not excel to plot the normal curve for a reasonable range, mean 0 and standard deviation of 1. Why did you select this particular range? Print the result and your code, which should be well commented and neat.

3.3 Vibration

3.3.1 What is the equation for the undamped natural frequency of vibration of an object such as a spring?

3.3.2 EXTRA CREDIT: Derive the equation beginning with the general undamped and unforced vibration equation

3.4 Stress/strain

A 400-lb chandelier is to be hung from two 10-ft long solid steel cables in tension. Choose a suitable diameter of cable which will not exceed an allowable stress of 5000psi. State all assumptions.

(Extra credit) What will be the deflection of the cables?