Please submit ONLY ONE MS Word or PDF file which includes your solutions for all problems.

**Problem 1**. A car has gone out of control during a snowstorm and struck a tree. Construct a cause-and- effect diagram that identifies and outlines the possible causes of the accident.

**Problem 2**. The 24 factorial was used to investigate the effects of four factors on the filtration rate of a resin for a chemical process plant. The factors are A = temperature, B = pressure, C = mole ratio (concentration of chemical formaldehyde), D = stirring rate. This experiment was performed in a pilot plant and the dataset can be found in sheet *Problem2* in *Homework 4.xlsx*.

1. Analyze this dataset of this factorial experiment with four-way interaction terms excluded. Identify what main effects, two-way interactions, and three-interactions are important?
2. Analyze this dataset of this factorial experiment with both three-way and four-way interaction terms excluded. Identify what main effects and two-way interactions are important?

**Problem 3**. Propose a visual control that can be used to mitigate the spread of COVID-19 in Florida.

**Problem 4**. A high-voltage power supply should have a nominal output voltage of 350 V. A sample of four units is selected each day and tested for process-control purposes. The data (see sheet *Problem4* in *Homework 4.xlsx*) give the difference between the observed reading on each unit and the nominal voltage times ten; that is,

𝑥𝑖 = (observed voltage on unit 𝑖 - 350)\*10

1. Set up 𝑥̅ and 𝑅 charts on this process. Is the process in statistical control? (2 points)
2. If specifications are at 350 V ± 5 V, estimate 𝐶𝑝 and 𝐶𝑝𝑘, 𝑃𝑝 and 𝑃𝑝𝑘? (2 points)
3. What can you say about process capability 𝐶𝑝?

**Problem 5**. Consider potential causes of delayed mails or packages and perform a FMEA (Failure Modes and Effects Analysis) to help reduce the chance of delay delivery.