Quiz 1

Please put your answers in the following table.

1	2	3	4	5	6	7	8	9	10

1. The deflection of two beams follow normal distributions are shown below. Which statement is true?
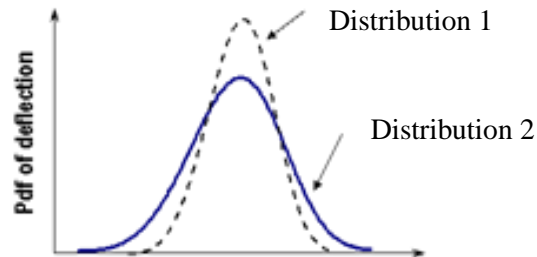
A) $\sigma_1 > \sigma_2$
B) $\sigma_1 < \sigma_2$
C) $\sigma_1 = \sigma_2$
D) Cannot determine

2. For Distribution 1 in problem 1, the mean value of the deflection is 0.002 m, what is the probability that the deflection is less than 0.002 m?
A) < 50%
B) > 50%
C) = 50%
D) Cannot determine

3. The values of a force (N) acting on a machine from ten measurements are given below.

86.9	95.7	103.4	135.8	127.7
86.5	130.3	107.3	99.4	107.1

The average of the force is
A) 100.0 N
B) 190.0 N
C) 108.0 N
D) 25.4 N

4. For problem 3, the standard deviation of the force is
A) 10.1 N
B) 0.0 N
C) 103.2 N
D) 17.68 N

5. A mean value indicates the dispersion of a random variable. (True or False)

6. The CDF of a random variable cannot be 0. (True or False)

7. The crate in equilibrium is subjected to a force F. The coefficient of friction between the crate and floor is 0.1. The weight of a crate is W lb. Knowing $W \sim N(\mu_W, \sigma_W^2)$, where $\mu_W = 10.0$ lb and $\sigma_F = 1.0$ lb, determine the mean and standard deviation of the force F.

    A) $\mu_F = 1.0$ lb, $\sigma_F = 0.1$ lb
    B) $\mu_F = 1.0$ lb, $\sigma_F = 1$ lb
    C) $\mu_F = 10$ lb, $\sigma_F = 0$ lb
    D) $\mu_F = 1.0$ lb, $\sigma_F = 0.01$ lb

8. For problem 7, what is the probability that the weight is less than 11 lb or $\Pr\{W < 11 \text{ lb}\}$?
    A) 0
    B) 50%
    C) 97.72%
    D) 84.13%

9. A crate is subject to two independently and normally distributed random forces $F_1 \sim N(100, 6^2)$ N and $F_2 \sim N(120, 8^2)$ N. If the two forces act in the same direction, the mean and standard deviation of the resultant force are
    A) 220 N and 10 N, respectively.
    B) 110 N and 7 N, respectively.
    C) 110 N and 14 N, respectively.
    D) 20 N and 10 N, respectively.

10. For problem 9, the distribution of the resultant force is also normal. (True or False)