Write legibly — if it cannot be read, it is presumed to be wrong. Show all of your work.

#1. Suppose you have the following sample: {-2, -1, 1, 2, 3, 4, 5}.

(a) Find the sample mean $\bar{x}$. (5 points)

(b) Find the sample variance $s^2$. (5 points)

(c) Find the sample standard deviation $s$. (5 points)
#2. Suppose you have the following probability distribution:

<table>
<thead>
<tr>
<th>x</th>
<th>0.1</th>
<th>0.4</th>
<th>0.3</th>
<th>0.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(x)</td>
<td>-5</td>
<td>-2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

(a) Find the distribution mean $\mu$. (5 points)

(b) Find the variance of the distribution $\sigma^2$. (10 points)
#3. Suppose $x$ is a binomial random variable with $n = 1,000$ and $p = 0.02$.

(a) Find the mean of the distribution. (5 points)

(b) Find the variance of the distribution. (5 points)
#4. Suppose \( x \) is a normal random variable with \( \mu = 10 \) and \( \sigma = 2 \).

(a) Find \( P(10 < x < 12.2) \). (5 points)

(b) Find \( P(x < 8) \). (5 points)

c) Find \( P(13 < x < 14) \). (5 points)
#5. Suppose $x$ is a normal random variable with $\mu = -5$ and $\sigma = 5$.

(a) Find $P(-8 < x < 5)$. (5 points)

(b) Find $P(x < -10)$. (5 points)

(c) Find $P(x > 0)$. (5 points)
#6. Suppose $x$ is normally distributed with unknown mean $\mu$ and unknown standard deviation $\sigma$. Suppose you draw a sample where the summary data are as follows:

- sample mean $= \bar{x} = 5$,
- sample variance $= s^2 = 10$, and
- sample size $= n = 5$.

(a) What is the 95% confidence interval for $\mu$? (10 points)

(b) What is the 90% confidence interval for $\mu$? (10 points)
Suppose $X$ and $Y$ are independent normal random variables where $X$ is $N(\mu_X = 0, \sigma_X^2 = 5)$ and $Y$ is $N(\mu_Y = 0, \sigma_Y^2 = 20)$.

Find $P(X > Y)$. (10 points)