Practice Final Exam Solutions

1.   a. To find the median, first order the numbers from smallest to largest as follows:

$$1.1 \quad 1.2 \quad 2.4 \quad 3.5 \quad 6.0$$

Since the sample size $n = 5$ is odd, the median is the middle number in the above list. Hence

median = 2.4

b. The sample mean is

$$\bar{x} = \frac{\sum x}{n} = \frac{1.1 + 1.2 + 2.4 + 3.5 + 6.0}{5} = \frac{14.2}{5} = 2.84$$

c. First, compute the sample variance s^2. We complete the following table:

x	x^2
1.1	1.21
1.2	1.44
2.4	5.76
3.5	12.25
6.0	36.00
$\sum x = 14.2$	$\sum x^2 = 56.66$

Now substitute the information in the above table into the formula for the sample variance as follows:

$$s^2 = \frac{n(\sum x^2) - (\sum x)^2}{n(n-1)} = \frac{5(56.66) - (14.2)^2}{5(5-1)} = \frac{283.3 - 201.64}{20} = \frac{81.66}{20} = 4.083$$

Hence the sample standard deviation is

$$s = \sqrt{s^2} = \sqrt{4.083} = 2.020 \ldots \approx 2.02$$

2. Let A be *teacher* and B be *female*. Then

$$P(A \text{ and } B) = P(A) \cdot P(B, \text{given } A) = (30\%)(55\%) = (.3)(.55) = .165$$

3. Let A be *male* and B be *liberal arts major*. Then

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = 52\% + 65\% - 41\% = 76\%$$

4.

$$a. \frac{62}{324} \quad b. \frac{63}{324} \quad c. \frac{106}{324} \quad d. \frac{47}{123} \quad e. \frac{100 + 123 - 47}{324} = \frac{176}{324}$$

5. The sample size is $n = 10$ and the probability of success is $p = 25\% = .25$.

    a. $P(0 \text{ or } 1 \text{ or } 2 \text{ or } 3) = P(0) + P(1) + P(2) + P(3) = .056 + .188 + .282 + .250 = .776$

    b. $\mu = np = 10(.25) = 2.5$

    c. $\sigma^2 = np(1 - p) = 10(.25)(1 - .25) = 10(.25).75) = 2.5(.75) = 1.875$

    $\sigma = \sqrt{\sigma^2} = \sqrt{1.875} = 1.369 \ldots \approx 1.37$

6.   a. $P(x \leq 44) = P(z \leq 1.98) = .9761$

    b. $P(\bar{x} \geq 19) = P(z \geq -2.79) = 1 - P(z \leq -2.79) = 1 - .0026 = .9974$

7. We are given the following information:

$$n = 6 \ \bar{x} = 1.1 \ s = 0.2 \ c = 95\% = .95$$

It follows that $d.f. = n - 1 = 6 - 1 = 5$. Hence

    a. $t = 2.571$

    b. $E = t \cdot \frac{s}{\sqrt{n}} = 2.571 \cdot \frac{0.2}{\sqrt{6}} = \frac{2.571 \times 0.2}{\sqrt{6}} = \frac{0.5142}{\sqrt{6}} = 0.209 \ldots \approx 0.21$
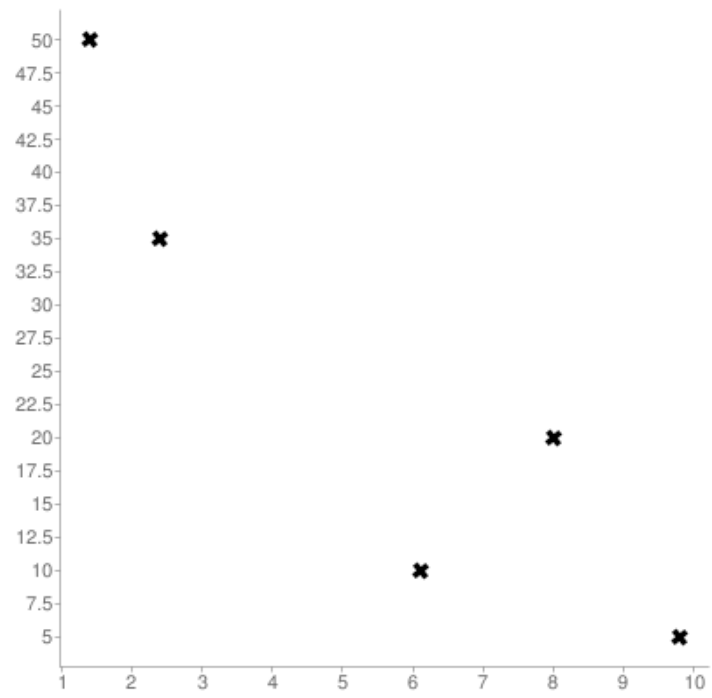
    c. $\bar{x} - E = 1.1 - 0.21 = 0.89$

    d. $\bar{x} + E = 1.1 + 0.21 = 1.31$

8.   a. $z = \frac{39 - 45}{3.41} = \frac{-6}{3.41} = -1.759 \ldots \approx -1.76$

    b. $P - \text{value} = P(\bar{x} \leq 39) = P(z \leq -1.76) = .0392$

    c. The correct choice is i.

9.   a.

b. negative