

(12.5 points) 1. Given the probability distribution below, complete the table and find

x	0	1	2	3	4	5	
p	0.20	0.15	0.30	0.05	0.20	0.10	

(a)  $\mu$ , the **expected value** of  $X$

(b)  $\sigma$ , the **standard deviation** of  $X$

(12.5 points) 2. Let  $X$  be the number of successes in 10 independent trials, where the probability of success on each trial is  $p = 0.58$

(a) Calculate  $P(X = 6)$ , showing the formula used.

(b) Complete the probability **distribution** table for  $X$ , using formula or a program.

(c) Find the **mean** of the distribution.

(d) Find the **standard deviation** of the distribution.

X	

(12.5 points) 3. Z has the standard normal distribution. Find, using a calculator, writing down the calculator command line. Draw a diagram of the normal curve with appropriate shading in parts (a) and (d).

(a)  $P(0 \leq z \leq 1.35)$  (Draw a graph.)

(b)  $P(z \geq 1.35)$

(c)  $P(z \geq -1.35)$

(d)  $z_0$ , so that  $P(z \geq z_0) = 14\%$  (Draw a graph.)

(e)  $z_0$ , so that  $P(|z| \geq z_0) = 14\%$

(12.5 points) 4. (a) Compute  $P(11, 4)$

(b) Compute  $\binom{11}{4}$

(c) When is it reasonable to use the normal approximation to the binomial?

(d) When is it reasonable to assume the sampling distribution of the mean,  $\bar{x}$ , is normal?

(e) The random variable Y is normally distributed, with mean 37 and standard deviation 5.5. Find  $P(29 \leq Y \leq 40)$

(12.5 points) 5. Let  $X$  be the number of successes in  $n = 2400$  independent trials where the probability of success on each trial is  $p = 0.4$ . Find

(a) the **mean** value of  $X$

(b) the **standard deviation** of  $X$

(c)  $P( X = 943 )$  by using the **normal approximation** to the binomial.

(d)  $P( 951 \leq X \leq 980 )$  by using the **normal approximation** to the binomial.

(12.5 points) 6. The heights of **196** trees in a sample are measured. If the **population mean** is **3.88** m with a **population standard deviation** of **0.7** m, find the probability that the **sample mean** is **less than 3.81** m.

(12.5 points) 7. If the **sample mean** is **29** for a sample of size **160**, and the population standard deviation is **8.50**, find the **92% confidence interval** for the population mean. Give the endpoints accurate to three or more decimal places.

(12.5 points) 8. Using a sample of size  $n$ , the endpoints of a confidence interval for the population mean are given by  $\bar{x} \pm 1.514(\sigma/\sqrt{n})$ .

(a) What is the value of  $\alpha$ ? (Can round to three digits.)

(b) What is the **confidence level**?

(c) If  $\sigma$  is **5.0**, find a **minimum sample size** so that the maximum error,  $E$ , is under **0.04** in size.

(12.5 points) 9. 55% of our gaskets come from company A, 25% from company B, and 20% from company C. 4% of A gaskets are defective, 8% of B gaskets are defective, and 9% of C gaskets are defective..

(a) Make a complete table with **labeled** headings to apply Bayes' Theorem to find the probabilities that a defective gasket came from each company.

(b) What is the probability that a randomly chosen gasket is defective? \_\_\_\_\_

(b) What is the probability that a defective gasket came from company B? \_\_\_\_\_
