Three potential employees took an aptitude test. Each person took a different version of the test. The scores are reported below.

Brittany got a score of 79.8; this version has a mean of 61.8 and a standard deviation of 9.

Tera got a score of 272.8; this version has a mean of 264 and a standard deviation of 22.

Justin got a score of 8.34; this version has a mean of 6.9 and a standard deviation of 0.6.

If the company has only one position to fill and prefers to fill it with the applicant who performed best on the aptitude test, which of the applicants should be offered the job?

B	$\frac{79.8-61.8}{9}$	$=2$
T	$\frac{272.8-264}{22}$	$=0.4$
J	$\frac{8.34-6.9}{0.6}$	$=2.4$

A pizza delivery company classifies its customers by gender and location of residence. The research department has gathered data from a random sample of 1888 customers. The data is summarized in the table below.

Gender and Residence of Customers		
Residence	**Males**	**Females**
Apartment	87	137
Dorm	276	189
With Parent(s)	137	289
Sorority/Fraternity House	262	166
Other	111	234

$$\frac{111+262}{1888} =$$

$$\boxed{.1976}$$

What is the probability that a customer is male and lives in 'Other' or is male and lives in a fraternity house? Express your answer as a fraction or a decimal number rounded to four decimal places.

Suppose you like to keep a jar of change on your desk. Currently, the jar contains the following:

18 Pennies 19 Dimes

16 Nickels 20 Quarters

What is the probability that you reach into the jar and randomly grab a dime and then, without replacement, a penny? Express your answer as a fraction or a decimal number rounded to four decimal places.

$$\left(\frac{19}{73}\right)\left(\frac{18}{72}\right) = .0651$$

A real estate agent has 17 properties that she shows. She feels that there is a $30\ \%$ chance of selling any one property during a week. The chance of selling any one property is independent of selling another property. Compute the probability of selling more than 5 properties in one week. Round your answer to four decimal places.

$$P(X>5) = 0.40318$$

Binomial Probability Distribution Function

The **binomial probability distribution function** is

$$P(X=x) = {}_nC_x p^x (1-p)^{n-x}$$

Suppose that you and a friend are playing cards and you decide to make a friendly wager. The bet is that you will draw two cards without replacement from a standard deck. If both cards are clubs, your friend will pay you $\$403$. Otherwise, you have to pay your friend $\$24$.

What is the expected value of your bet? Round your answer to two decimal places. Losses must be expressed as negative values.

$$\frac{13}{52} \cdot \frac{12}{51} = (.0588)(403) = 23.70$$

$$= (.9412)(-24) = -22.59$$

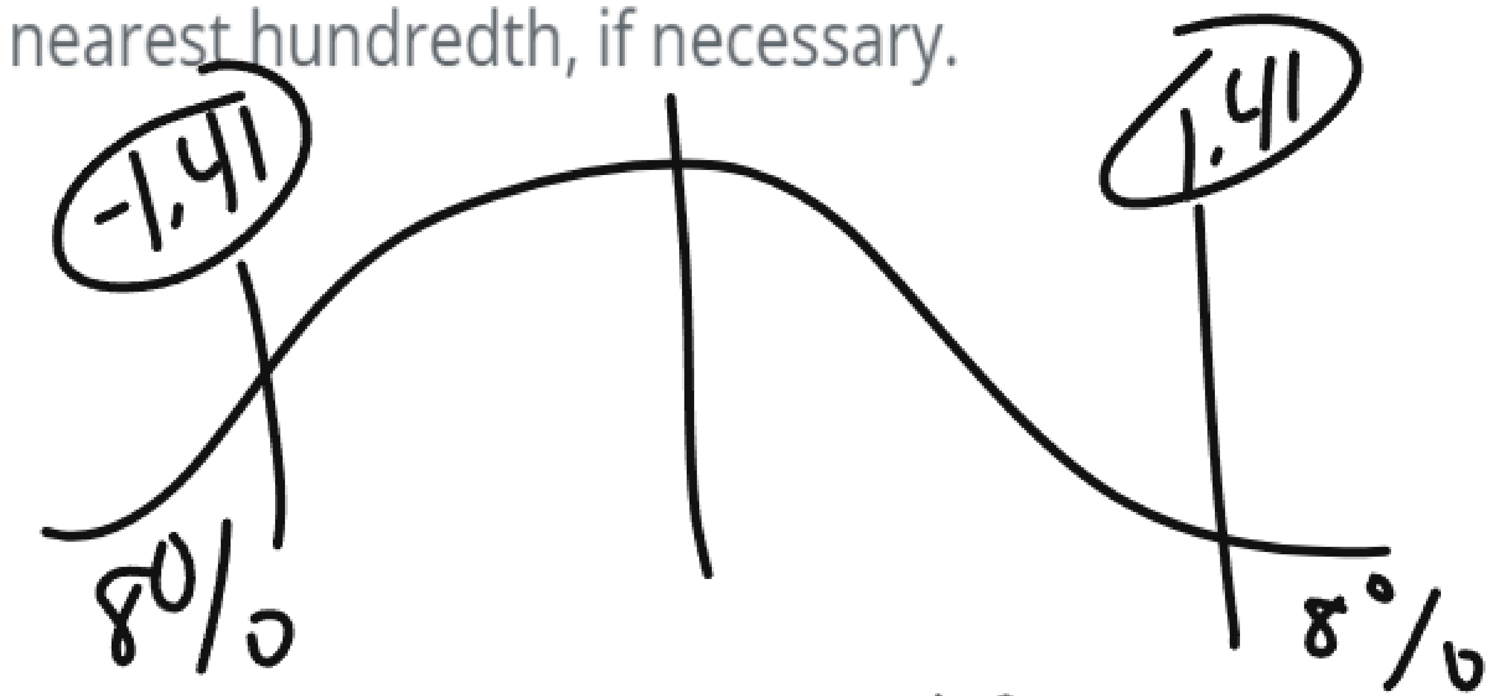
$$Ex.V. = 1.11$$

Suppose that you and a friend are playing cards and you decide to make a friendly wager. The bet is that you will draw two cards without replacement from a standard deck. If both cards are clubs, your friend will pay you $\$403$. Otherwise, you have to pay your friend $\$24$.

If this same bet is made 845 times, how much would you expect to win or lose? Round your answer to two decimal places. Losses must be expressed as negative values.

$$(1.11)(845) = \$937.95$$

The weights of certain machine components are normally distributed with a mean of 5.19 ounces and a standard deviation of 0.05 ounces. Find the two weights that separate the top 8 % and the bottom 8 %. These weights could serve as limits used to identify which components should be rejected. Round your answer to the nearest hundredth, if necessary.



$$z = \frac{x - \mu}{\sigma} \rightarrow -1.41 = \frac{x - 5.19}{0.05} \qquad 1.41 = \frac{x - 5.19}{0.05}$$

$$-0.0705 = x - 5.19 \qquad 0.0705 = x - 5.19$$

$$5.12 = x \qquad 5.26 = x$$

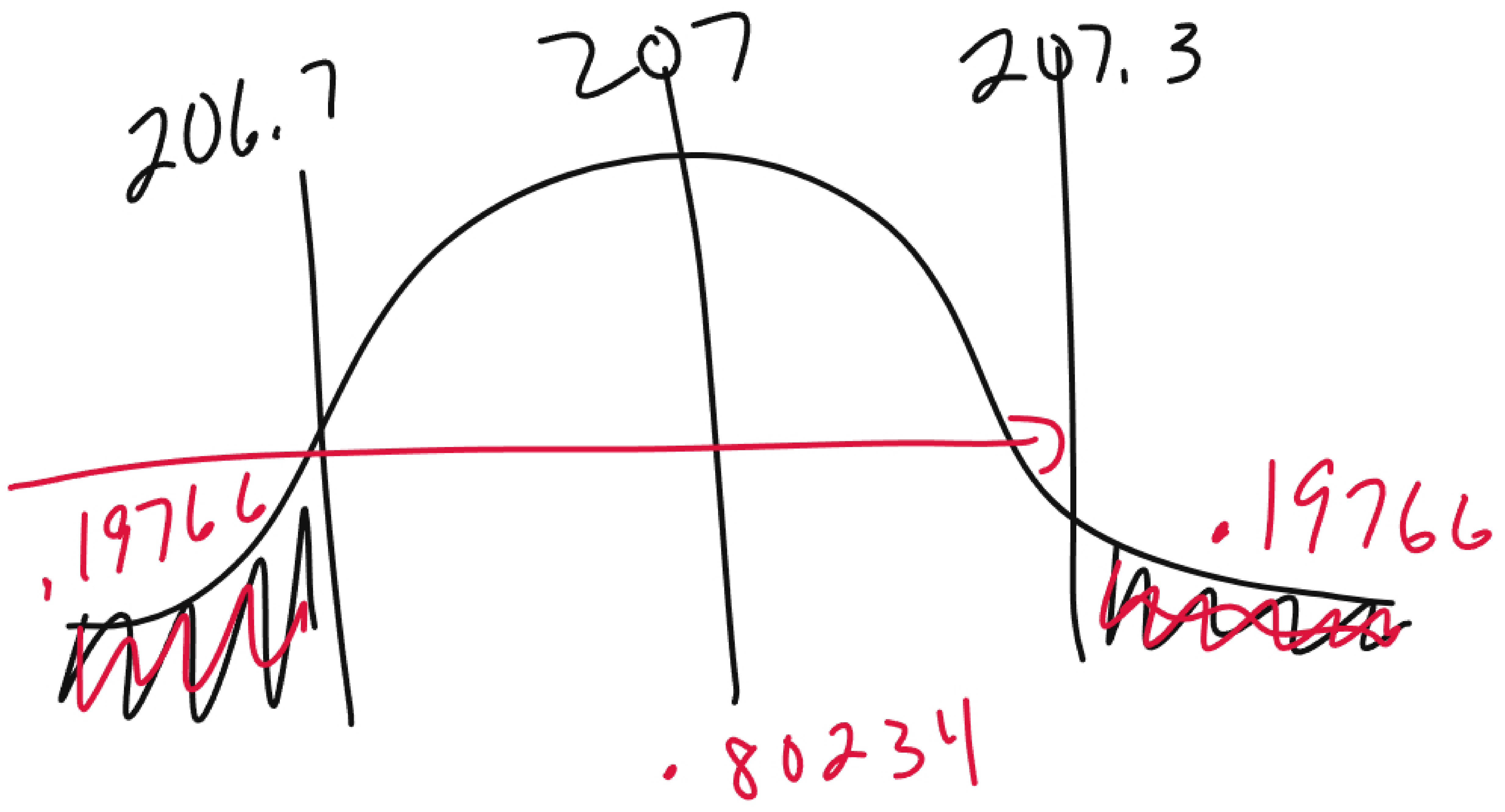
Suppose a batch of metal shafts produced in a manufacturing company have a variance of 9 and a mean diameter of 207 inches.

$\sigma = 3$

If 72 shafts are sampled at random from the batch, what is the probability that the mean diameter of the sample shafts would differ from the population mean by greater than 0.3 inches? Round your answer to four decimal places.

$$z = \frac{207.3 - 207}{\frac{3}{\sqrt{72}}}$$

$$z = .8485$$


206.7
207
207.3
.19766
.19766
.80234

An economist wants to estimate the mean per capita income (in thousands of dollars) for a major city in California. Suppose that the mean income is found to be $24.3 for a random sample of 758 people. Assume the population standard deviation is known to be $9.2. Construct the 90 % confidence interval for the mean per capita income in thousands of dollars. Round your answers to one decimal place.

$90\% \to 1.645$

$24.3 \pm 1.645\left(9.2/\sqrt{758}\right)$

$\mu \pm z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$

$24.3 - 1.645\left(\frac{9.2}{\sqrt{758}}\right)$	$= 23.75030837$
$24.3 + 1.645\left(\frac{9.2}{\sqrt{758}}\right)$	$= 24.84969163$

An engineer has designed a valve that will regulate water pressure on an automobile engine. The valve was tested on 280 engines and the mean pressure was 6.8 lbs/square inch. Assume the standard deviation is known to be 0.9. If the valve was designed to produce a mean pressure of 6.7 lbs/square inch, is there sufficient evidence at the 0.05 level that the valve does not perform to the specifications?

State the null and alternative hypotheses for the above scenario.

$$H_0 \rightarrow \mu = 6.7$$

$$H_a \rightarrow \mu \neq 6.7$$

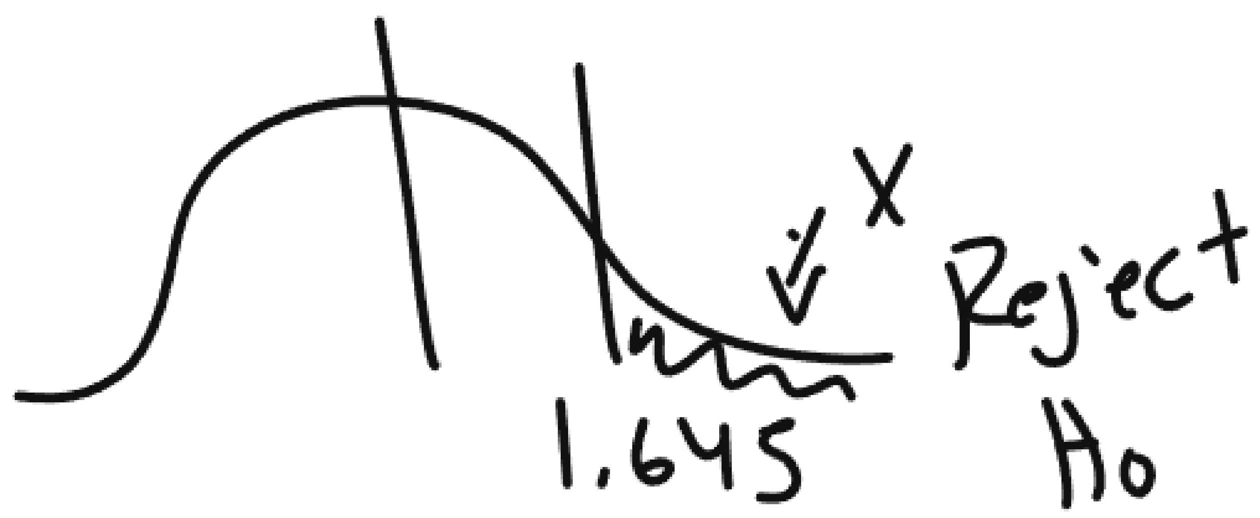
An engineer designed a valve that will regulate water pressure on an automobile engine. The engineer designed the valve such that it would produce a mean pressure of 4.3 pounds/square inch. It is believed that the valve performs above the specifications. The valve was tested on 280 engines and the mean pressure was 4.4 pounds/square inch. Assume the variance is known to be 0.64. A level of significance of 0.05 will be used. Make a decision to reject or fail to reject the null hypothesis.

Make a decision.

one tail $\alpha = 0.05$ z

$H_0 \rightarrow \mu = 4.3$

$H_a \rightarrow \mu > 4.3$



$$z = \frac{4.4 - 4.3}{.8/\sqrt{280}} = 2.09$$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

An automobile manufacturer claims that its jeep has a 33.4 miles/gallon (MPG) rating. An independent testing firm has been contracted to test the MPG for this jeep since it is believed that the jeep has an incorrect manufacturer's MPG rating. After testing 230 jeeps, they found a mean MPG of 33.1. Assume the standard deviation is known to be 2.5. A level of significance of 0.02 will be used. Make a decision to reject or fail to reject the null hypothesis.

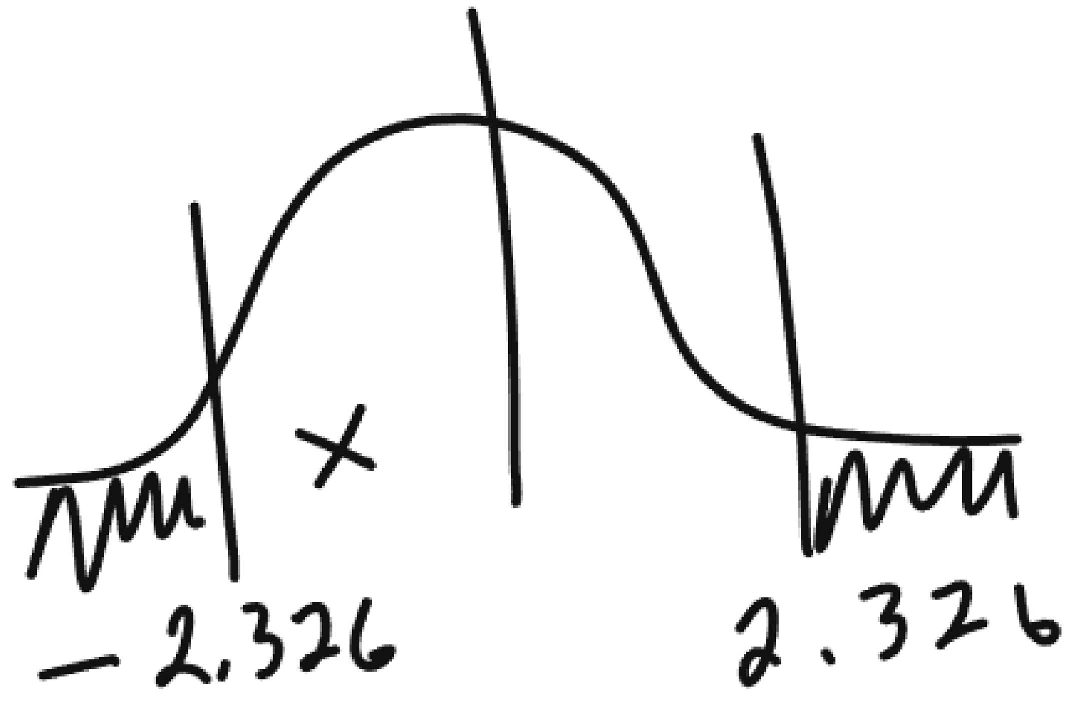
Make a decision.

$\alpha = 0.02$ two-tails z

$H_0 \rightarrow \mu = 33.4$

$H_a \rightarrow \mu \neq 33.4$

$$z = \frac{33.1 - 33.4}{2.5/\sqrt{230}} = -1.82$$



Fail to Reject

An engineer designed a valve that will regulate water pressure on an automobile engine. The engineer designed the valve such that it would produce a mean pressure of 7.5 pounds/square inch. It is believed that the valve performs above the specifications. The valve was tested on 24 engines and the mean pressure was 7.8 pounds/square inch with a standard deviation of 0.7. A level of significance of 0.05 will be used. Assume the population distribution is approximately normal. Make the decision to reject or fail to reject the null hypothesis.

$\alpha = 0.05$ onetail t-test

$d.f. = 24 - 1 = 23$

$H_0 \rightarrow \mu = 7.5$ Reject

$H_a \rightarrow \mu > 7.5$

$t = \dfrac{7.8 - 7.5}{0.7/\sqrt{24}} = 2.10$

1.714

A manufacturer of chocolate chips would like to know whether its bag filling machine works correctly at the 433 gram setting. It is believed that the machine is underfilling the bags. A 26 bag sample had a mean of 426 grams with a standard deviation of 17. A level of significance of 0.025 will be used. Assume the population distribution is approximately normal. Is there sufficient evidence to support the claim that the bags are underfilled?

$\alpha = 0.025$ one t-test

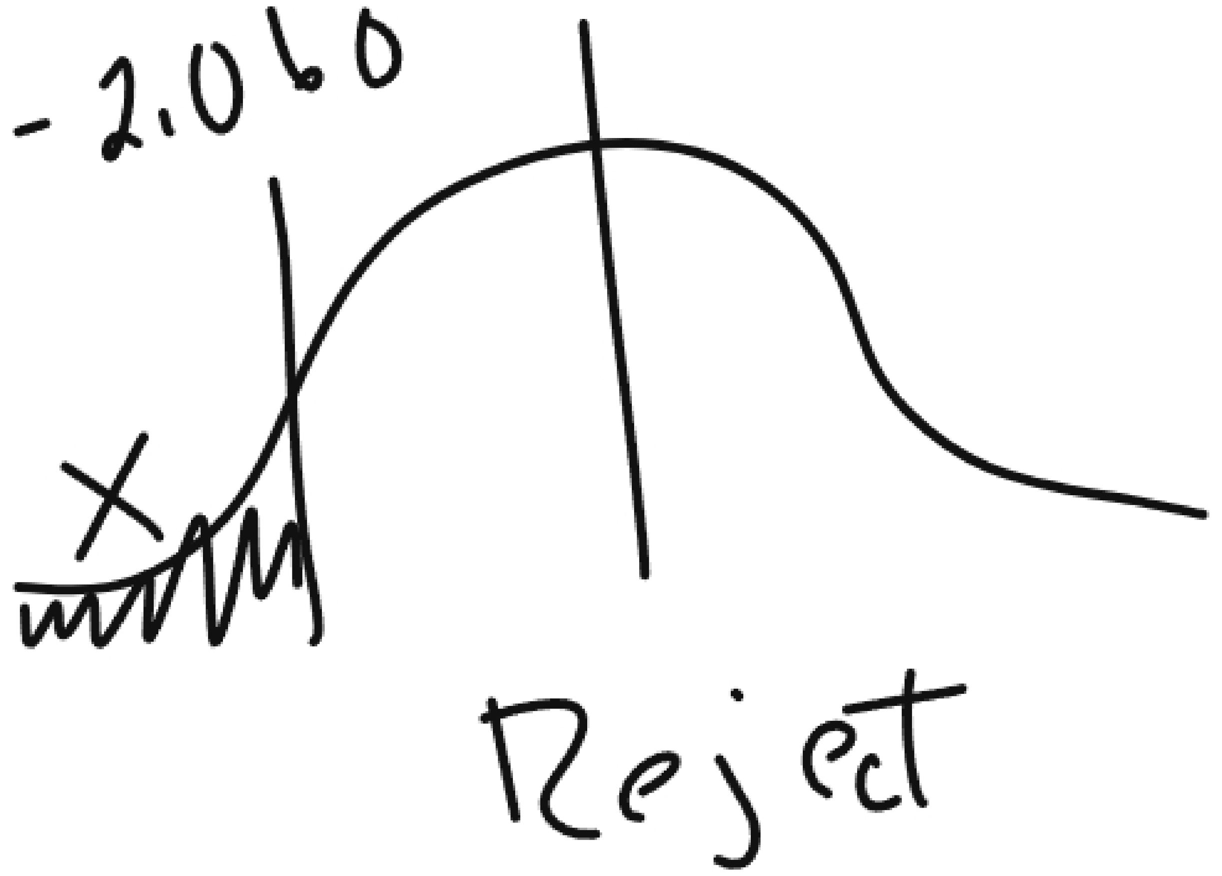
d.f. $= 25$

-2.060

$H_0 \rightarrow \mu = 433$

$H_a \rightarrow \mu < 433$

$$t = \frac{426-433}{17/\sqrt{26}} = -2.10$$



Enable Show Work

An engineer has designed a valve that will regulate water pressure on an automobile engine. The valve was tested on 180 engines and the mean pressure was 6.0 pounds/square inch (psi). Assume the population variance is 0.81. If the valve was designed to produce a mean pressure of 6.2 psi, is there sufficient evidence at the 0.05 level that the valve does not perform to the specifications?

Two teaching methods and their effects on science test scores are being reviewed. A random sample of 16 students, taught in traditional lab sessions, had a mean test score of 77.5 with a standard deviation of 5.7. A random sample of 11 students, taught using interactive simulation software, had a mean test score of 85.9 with a standard deviation of 6. Do these results support the claim that the mean science test score is lower for students taught in traditional lab sessions than it is for students taught using interactive simulation software? Let μ_1 be the mean test score for the students taught in traditional lab sessions and μ_2 be the mean test score for students taught using interactive simulation software. Use a significance level of $\alpha = 0.05$ for the test. Assume that the population variances are equal and that the two populations are normally distributed.

State the null and alternative hypotheses for the test.

$\alpha = 0.05$

$H_0 \to \mu_1 - \mu_2 = 0$

$H_a \to \mu_1 - \mu_2 < 0$

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Compute the value of the t test statistic. Round your answer to three decimal places.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{s_p^2\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}},$$

where $s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$

$$s = \frac{(16-1)5.7^2 + (11-1)6^2}{16 + 11 - 2} = 33.894$$

$$t = \frac{77.5 - 85.9}{\sqrt{33.894\left(\frac{1}{16} + \frac{1}{11}\right)}} = -3.683768461$$

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Determine the decision rule for rejecting the null hypothesis H_0. Round your answer to three decimal places.

$df: 16 + 11 - 2 = 25$

one tail

$\alpha = 0.05$

$t < -1.708$

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State the test's conclusion.