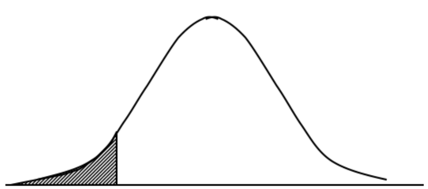
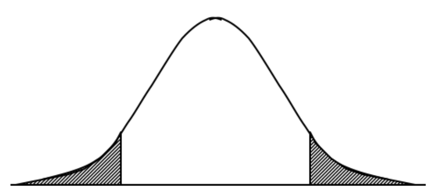
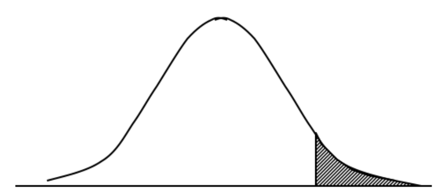
Uji Hipotesis

Bagian dua

Uji Hipotesis satu dan dua ekor …

Uji Satu Ekor (Ekor kiri)	Uji dua ekor	Uji satu Ekor (Ekor kanan)
$H_0 : \mu = \mu_0$ $H_1 : \mu < \mu_0$	$H_0 : \mu = \mu_0$ $H_1 : \mu \neq \mu_0$	$H_0 : \mu = \mu_0$ $H_1 : \mu > \mu_0$
		

Uji hipotesis rata-rata, variansi diketahui

1. Hipotesis :

$$H_0: \mu = \mu_0$$
$$H_1: \mu \neq \mu_0$$

2. Pilih tingkat signifikansi α
3. Hitungan statistika

$$Z_0 = \frac{\overline{X} - \mu_0}{\sigma/\sqrt{n}}$$

Daerah kritis

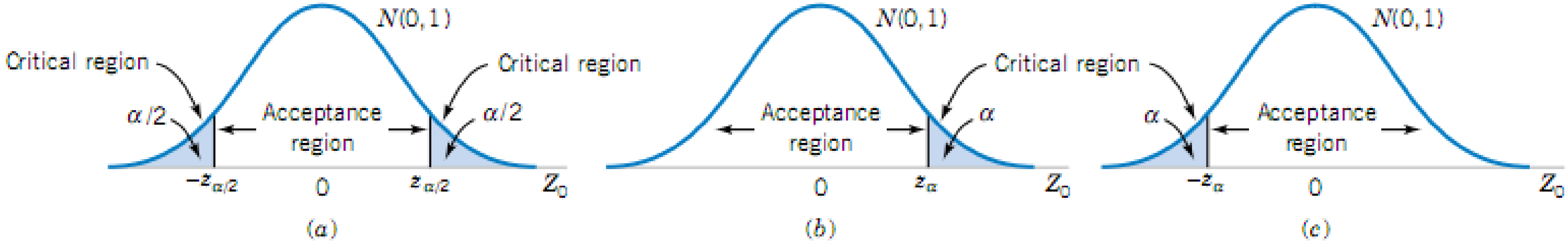


Figure 9-6 The distribution of Z_0 when H_0: $\mu = \mu_0$ is true, with critical region for (a) the two-sided alternative $H_1 : \mu \neq \mu_0$, (b) the one-sided alternative $H_1 : \mu > \mu_0$, and (c) the one-sided alternative $H_1 : \mu < \mu_0$.

Langkah-langkah uji hipotesis

i. Hipotesis :

$$a.\ H_0 : \mu = \mu_0$$

$$H_1 : \mu \neq \mu_0$$

$$b.\ H_0 : \mu = \mu_0$$

$$H_1 : \mu > \mu_0$$

$$c.\ H_0 : \mu = \mu_0$$

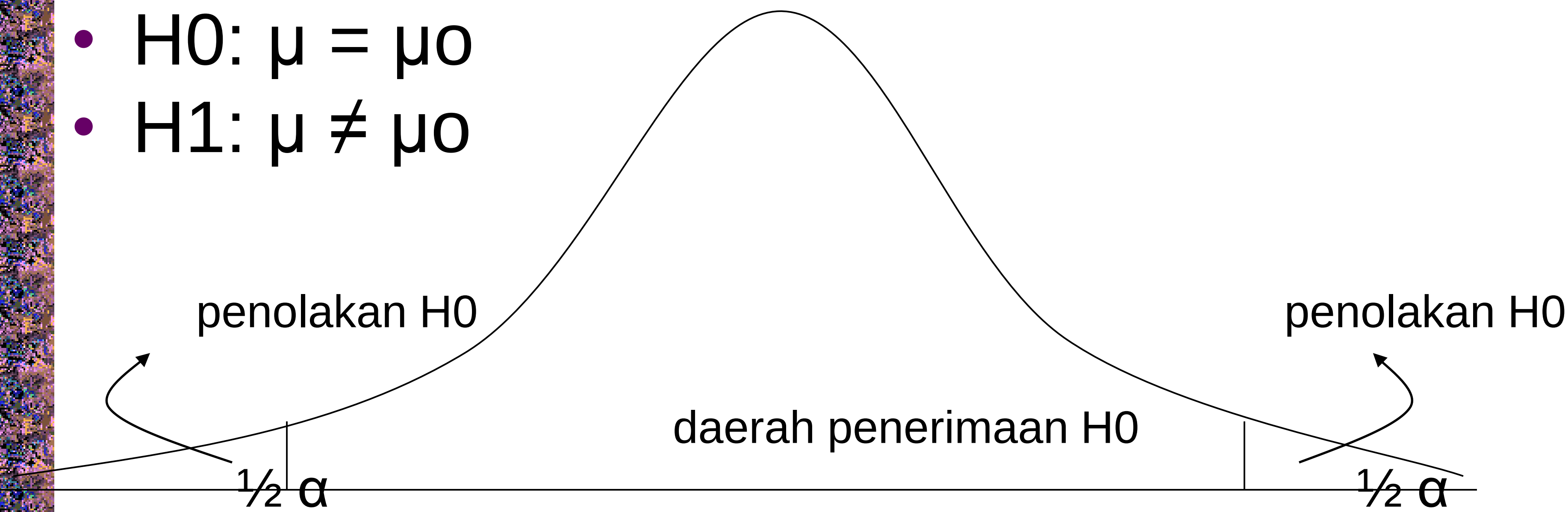
$$H_1 : \mu < \mu_0$$

ii. Tingkat Signifikansi

H1:
SALAH SATU DARI METODE PEMBELAJARAN LEBIH UNGGUL DARIPADA METODE PEMBELAJARAN YANG LAIN

UJI DUA PIHAK

- H0: $\mu = \mu o$
- H1: $\mu \neq \mu o$

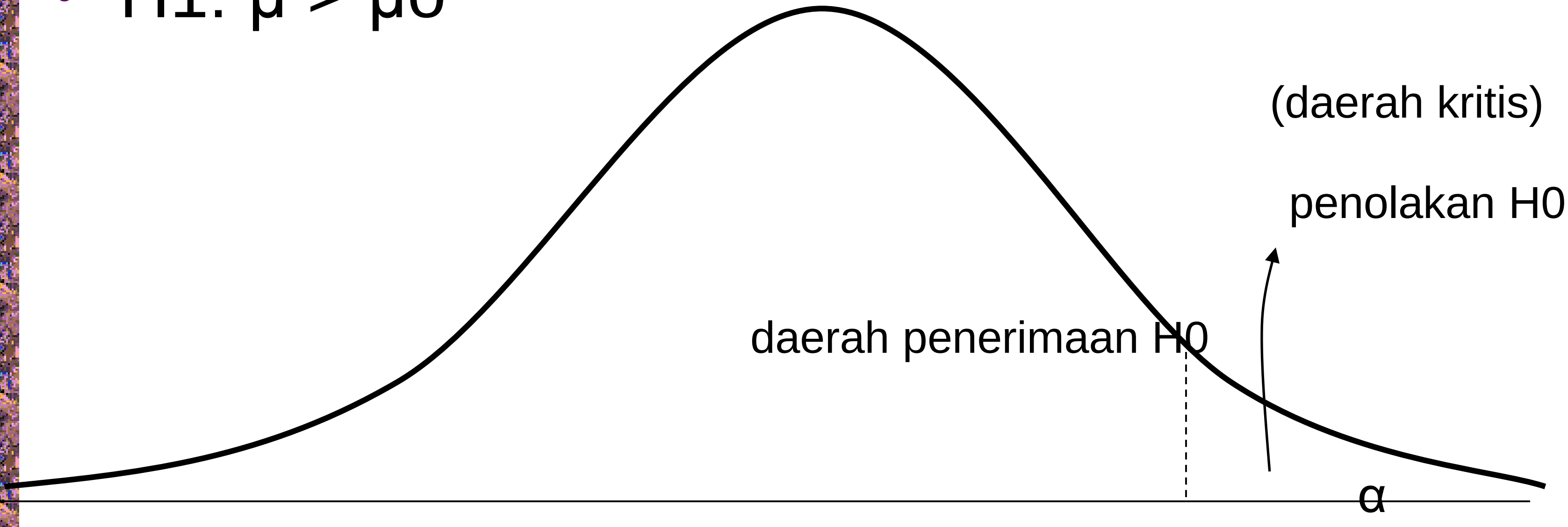


iii. Hipotesis H0 diterima jika: $-z_{1/2\alpha} < z < z_{1/2\,\alpha}$

H1:
METODE PEMBELAJARAN A LEBIH UNGGUL DARI PADA METODE PEMBELAJARAN B

UJI SATU PIHAK (KANAN)

- H0: μ = μo
- H1: μ > μo



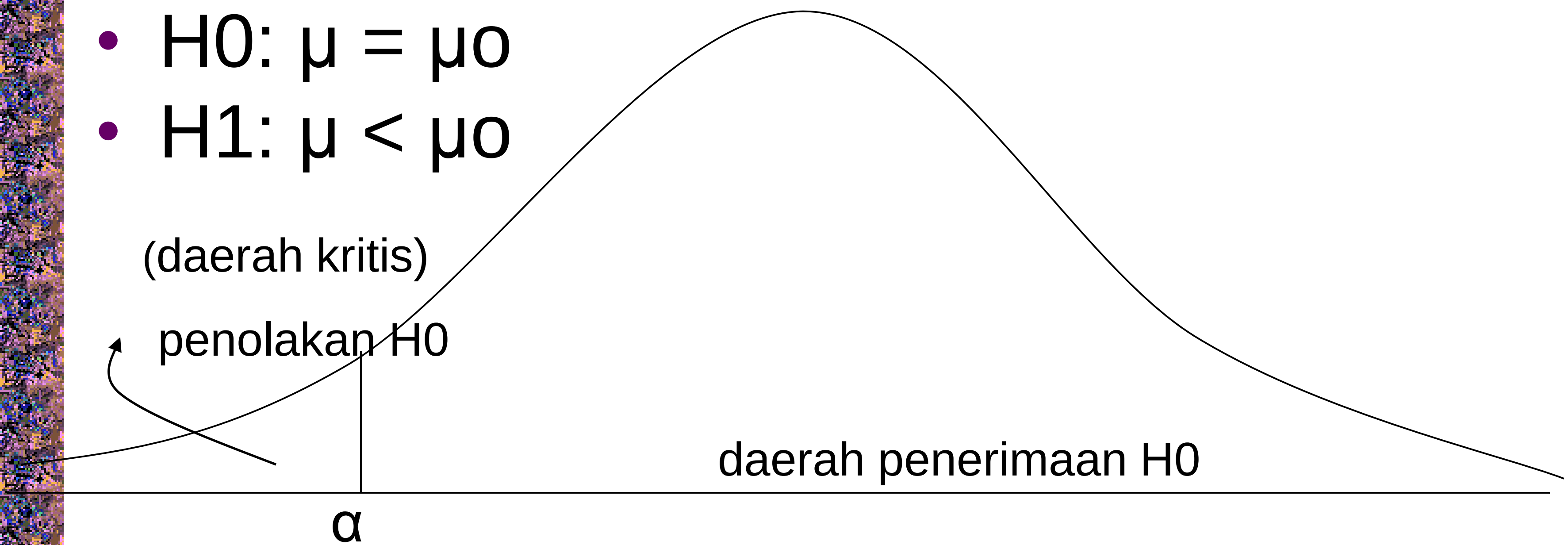
iii. Hipotesis H0 diterima jika: $z \leq z_{\alpha}$

H_1:

DENGAN SISTEM INJEKSI PENGGUNAAN BAHAN BAKAR LEBIH IRIT DARIPADA SISTEM BIASA

UJI SATU PIHAK (KIRI)

- H0: $\mu = \mu o$
- H1: $\mu < \mu o$



iii. Hipotesis H0 diterima jika: $z \geq -z_{\alpha}$

iv. Hitungan :

$$Z = \frac{\bar{X} - \theta_0}{\sigma / \sqrt{n}}$$

$$Z = \frac{\bar{X} - \theta_0}{s / \sqrt{n}} \text{ jika } \sigma \text{ tidak diketahui}$$

Contoh

Akan diuji bahwa rata-rata tinggi mahasiswa Pendidikan BIOLOGI adalah 160 cm atau berbeda dari itu. Jika tingkat signifikansi 5% dan diambil sampel random 100 orang mahasiswa ternyata rata-rata 163.5 cm dengan deviasi standar 4.8 cm. Apakah hipotesis di atas benar?

Penyelesaian

i. Hipotesis : $H_0 : \mu = 160$

$H_1 : \mu \neq 160$

ii. Tingkat signifikansi α=0.05

iii. H0 diterima jika

$$H_0 \text{ ditolak jika } Z < -Z_{\frac{\alpha}{2}} \text{ atau } Z > Z_{\frac{\alpha}{2}}$$

$$H_0 \text{ ditolak jika } Z < -1.96 \text{ atau } Z > 1.96$$

iv. Hitungan $$Z = \frac{\bar{X} - \mu_0}{\sigma / \sqrt{n}} = \frac{163.5 - 160}{4.8 / \sqrt{100}} = 7.29$$

v. Karena

Z=7.29>1.96 maka H0 ditolak

Jadi $H_1 : \mu \neq 160$ diterima dkl rata-rata TB mahasiswa P. Bio berbeda dari 160 cm

Uji Hipotesis rata-rata berdistribusi Normal, variansi tidak diketahui

Null hypothesis: $H_0\colon \mu = \mu_0$

Test statistic: $$T_0 = \frac{\bar{X} - \mu_0}{S/\sqrt{n}}$$

Alternative hypothesis	Rejection criteria
$H_1\colon \mu \neq \mu_0$	$t_0 > t_{\alpha/2,n-1}$ or $t_0 < -t_{\alpha/2,n-1}$
$H_1\colon \mu > \mu_0$	$t_0 > t_{\alpha,n-1}$
$H_1\colon \mu < \mu_0$	$t_0 < -t_{\alpha,n-1}$

Daerah kritis

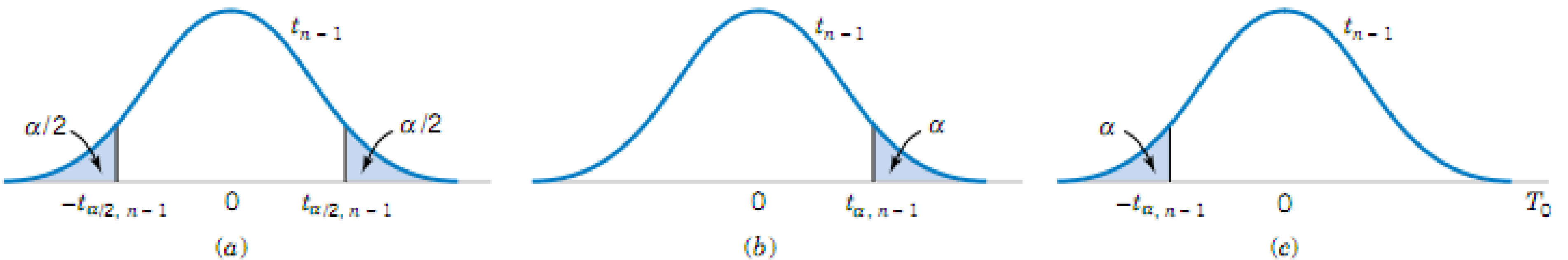


Figure 9-8 The reference distribution for H_0: $\mu = \mu_0$ with critical region for (a) H_1: $\mu \neq \mu_0$, (b) H_1: $\mu > \mu_0$, and (c) H_1: $\mu < \mu_0$.

contoh

Rata-rata sampel 0.83725 dan standar deviasi =0.02456

1. The parameter of interest is the mean coefficient of restitution, μ.
2. H_0: $\mu = 0.82$
3. H_1: $\mu > 0.82$. We want to reject H_0 if the mean coefficient of restitution exceeds 0.82.
4. $\alpha = 0.05$
5. The test statistic is

$$t_0 = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

6. Reject H_0 if $t_0 > t_{0.05,14} = 1.761$
7. Computations: Since $\bar{x} = 0.83725$, $s = 0.02456$, $\mu_0 = 0.82$, and $n = 15$, we have

$$t_0 = \frac{0.83725 - 0.82}{0.02456/\sqrt{15}} = 2.72$$

8. Conclusions: Since $t_0 = 2.72 > 1.761$, we reject H_0 and conclude at the 0.05 level of significance that the mean coefficient of restitution exceeds 0.82.

uji hipotesis PROPORSI

i. Hipotesis :

$$a. H_0 : P = P_0$$
$$H_1 : P \neq P_0$$
$$b. H_0 : P = P_0$$
$$H_1 : P > P_0$$
$$c. H_0 : P = P_0$$
$$H_1 : P < P_0$$

ii. Tingkat Signifikansi

iii. Daerah Kritik :

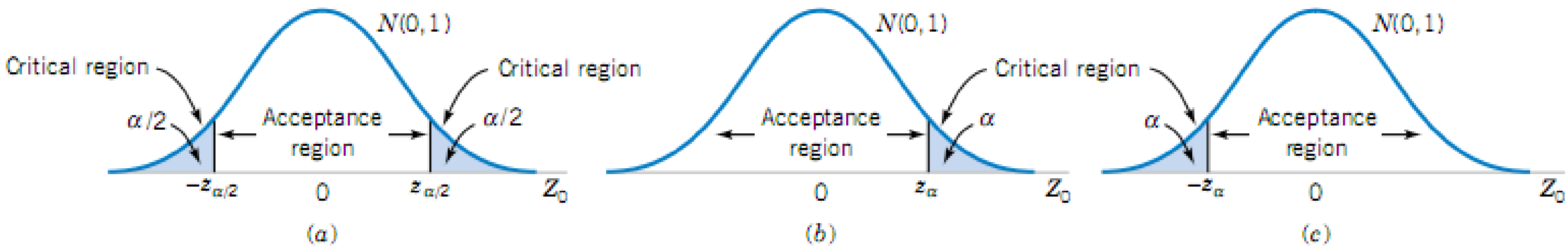


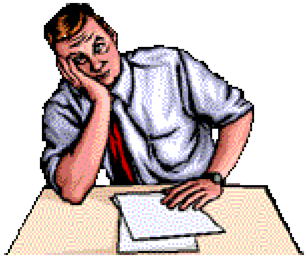
Figure 9-6 The distribution of Z_0 when H_0: $\mu = \mu_0$ is true, with critical region for (a) the two-sided alternative $H_1 : \mu \neq \mu_0$, (b) the one-sided alternative $H_1 : \mu > \mu_0$, and (c) the one-sided alternative $H_1 : \mu < \mu_0$.

iv. Hitungan :

$$Z_0 = \frac{X - np_0}{\sqrt{np_0(1 - p_0)}}$$

Contoh

Seorang apoteker menyatakan bahwa obat penenang buatannya manjur 90%. Ternyata dalam sampel 200 orang, obat tersebut hanya manjur untuk 160 orang. Apakah pernyataan apoteker tsb benar?



Penyelesaian

i. Hipotesis : $H_0 : P = 0.9$

$H_1 : P < 0.9$

ii. Tingkat signifikansi 0.05

iii. Hipotesis H0 diterima jika: $z \geq -z_\alpha$

$z \geq -1.64$

iv. Hitungan

$$Z = \frac{\frac{X}{n} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}} = \frac{\frac{160}{200} - 0.9}{\sqrt{\frac{0.9(1-0.9)}{200}}} = -4.717$$

Karena z=-4.717 < -1.64 maka H0 ditolak

d.k.l :

Pernyataan apoteker itu tidak benar

Atau pernyataan bahwa obat penenang buatannya manjur 90% adalah TIDAK BENAR

SOAL Time : 20'

Batas ambang rata-rata kadar bahan pencemar yang diperbolehkan adalah 25. Dari hasil pengumpulan populasi air ledeng suatu kota didapatkan :

30 20 25 21 24 18 10 15 12

Dapatkah dikatakan bahwa air ledeng kota tersebut sudah tercemar? Anggap tingkat signifikansi 0.05 dan diketahui z(0.05)=1.64

Latihan

9-20. The mean water temperature downstream from a power plant cooling tower discharge pipe should be no more than 100°F. Past experience has indicated that the standard deviation of temperature is 2°F. The water temperature is measured on nine randomly chosen days, and the average temperature is found to be 98°F.

(a) Should the water temperature be judged acceptable with $\alpha = 0.05$?

(b) What is the P-value for this test?

(c) What is the probability of accepting the null hypothesis at $\alpha = 0.05$ if the water has a true mean temperature of 104 °F?

9-21. Reconsider the chemical process yield data from Exercise 8-9. Recall that $\sigma = 3$, yield is normally distributed and that $n = 5$ observations on yield are 91.6%, 88.75%, 90.8%, 89.95%, and 91.3%. Use $\alpha = 0.05$.

(a) Is there evidence that the mean yield is not 90%?

(b) What is the P-value for this test?

(c) What sample size would be required to detect a true mean yield of 85% with probability 0.95?

9-32. Cloud seeding has been studied for many decades as a weather modification procedure (for an interesting study of this subject, see the article in *Technometrics* by Simpson, Alsen, and Eden, "A Bayesian Analysis of a Multiplicative Treatment Effect in Weather Modification", Vol. 17, pp. 161–166). The rainfall in acre-feet from 20 clouds that were selected at random and seeded with silver nitrate follows: 18.0, 30.7, 19.8, 27.1, 22.3, 18.8, 31.8, 23.4, 21.2, 27.9, 31.9, 27.1, 25.0, 24.7, 26.9, 21.8, 29.2, 34.8, 26.7, and 31.6.

(a) Can you support a claim that mean rainfall from seeded clouds exceeds 25 acre-feet? Use $\alpha = 0.01$.

(b) Is there evidence that rainfall is normally distributed?

(c) Compute the power of the test if the true mean rainfall is 27 acre-feet.

(d) What sample size would be required to detect a true mean rainfall of 27.5 acre-feet if we wanted the power of the test to be at least 0.9?

(e) Explain how the question in part (a) could be answered by constructing a one-sided confidence bound on the mean diameter.