



Stockholms universitet

OBS! Läs noga igenom anvisningarna i tentamen, t.ex. hur du ska skriva svaren. Det är ditt ansvar som student att följa de anvisningar som ges.

NOTE! Read the examination instructions carefully, e.g. how to write the answers. It is your responsibility as a student to follow the given instructions.

Skriv din anonymiseringskod och dagens datum på allt material du lämnar in.
(Enter your anonymization code and today's date on all submitted materials)

Anonymiseringskod (Anonymization code)	3	1	1	-	0	1	2	5	-	B	F	T
Datum (Date YYYY-MM-DD)	2022-06-03						Plats nr. (Seat No.)	86				

Kurs/Kurskod (Course/Course code)	STE101
Kursmoment (Course component)	Statistik för ekonomer

Fylls i av tentamensvärd (To be filled in by invigilator)

Direkt i skrivning: (kryss)		Svarsblankett: (kryss)	X	Lösa svarsblad: (antal)	3
--------------------------------	--	---------------------------	---	----------------------------	---

Lämnat in blankt: (kryss)		Dator: (kryss)	
------------------------------	--	-------------------	--

Inlämningstid: 17:12

Signatur tentamensvärd: _____

Fylls i av lärare/examinator (To be filled in by teacher/examinator)

Betyg:	A	Poäng:	95
--------	---	--------	----

Signatur rättande lärare/examinator: _____

E. Jönsson



Stockholm University

BASIC STATISTICS FOR ECONOMISTS, STE101. ANSWER FORM

Department of statistics

2022-06-03

Room: Uggleviken

Anonymity code: 311 - 0125 - BFT

Mark **clearly** your chosen option in the corresponding boxes below.

Marking two or more options in the same question will invalidate the results for that question.

Note: If, after checking your calculations carefully, you are convinced that the correct answer is not included among the given alternatives, write your answer in the margin to the right and explain your reasoning on the back.

	A	B	C	D	E
1				X	
2					X
3				X	
4	X				X
5		X			
6			X	X	
7				X	
8		X			
9		X			
10	X				
11				X	
12		X			



Datum: (Date YYYY-MM-DD)											Kurs/Kurskod: (Course/Course code)				Sidnr.: (Page no.)
Anonymiseringskod (Anonymization code)	3	1	1	-	0	1	2	5	-	B	F	T	(1)		

13

$$X \sim N(63, 12)$$

Uppg.nr.:
(Task no.)

13

a) $P(X \leq q_1) = 0.25$

$$Z = \frac{X - \mu_x}{\sigma_x} \sim N(0,1)$$

$$P\left(Z \leq \frac{X - 63}{\sqrt{12}}\right) = 0.25$$

using table 2

WR

$$\frac{X - 63}{12} = -0.6745 \rightarrow X = 54.905$$

$$X \text{ value} \rightarrow \boxed{q_1 = 54.905} \checkmark$$

Lärarens kommentar:
(Teacher's note)

b) $P(X \geq q_3) = 0.25$

$$P\left(Z \geq \frac{X - 63}{12}\right) = 0.25$$

using
table 2

$$\frac{X - 63}{12} = 0.6745$$

WR

$$X = 71.094$$

$$\boxed{q_3 = 71.094} \checkmark$$

c) $IQR = q_3 - q_1 = 71.094 - 54.905 = 16.189$

WR

$$\boxed{IQR = 16.189} \checkmark$$

d) The probability that the score is an outlier

$$\text{is } P(X > q_3 + IQR) + P(X < q_1 - IQR)$$

$$q_3 + IQR = 87.283$$

$$q_1 - IQR = 38.716$$

$$P(X > 87.283) \rightarrow P\left(Z > \frac{87.283 - 63}{12}\right)$$

$$\rightarrow P(Z > 2.024) = 1 - P(Z \leq 2.024) = 1 - 0.97831$$

$$= 0.022$$

$$P(X < 38.716) = P\left(Z < \frac{38.716 - 63}{12}\right)$$

$$= P(Z < -2.024) = 1 - P(Z \leq 2.024)$$

$$= 1 - 0.97831 = 0.022$$

(or by symmetry $P(X > q_3 + IQR) = P(X < q_1 - IQR)$)

$$\boxed{P(\text{score is an outlier}) = 0.022 \times 2 = 0.044}$$

Poäng:
(Points)

14

Uppg.nr.:
(Task no.)

Lärarens
kommentar:
(Teacher's
note)

Poäng:
(Points)



(e) $n = 10$ $p = 0.044$ $p \approx 0.05$ (use table)

13

32

$$P(X \geq 1) = 1 - P(X \leq 0) = 1 - 0.59874 = 0.40126$$

$P(\text{at least one out of 10 is an outlier}) \approx 0.40$

(A) $n = 300$ $p = 0.044$ $n > 30$

$E(X) = np = 13.2$ $V(X) = npq = 12.6192$

32

$$P(X > 20) = P\left(Z > \frac{20 - 13.2}{\sqrt{12.6192}}\right)$$

$$P(Z > 1.91) = 1 - P(Z < 1.91)$$

$$= 1 - 0.97193 \approx 0.028$$

$P(\text{more than 20 out of 300 are outliers}) = 0.028$

Uppg.nr.:
(Task no.)

Lärarens
kommentar:
(Teacher's
note)

Poäng:
(Points)



L4

$$B - A > 0$$

$$u_A, u_B > 30$$

$$s_A, s_B$$

Uppg.nr.:
(Task no.)

14

Lärarens kommentar:
(Teacher's note)

(a) $H_0 : \mu_B - \mu_A = 0 \iff D_0 = 0$

or $H_a : \mu_B - \mu_A > 0 \iff D_0 > 0$

b)
$$Z = \frac{\bar{X} - \bar{Y} - D_0}{\sqrt{\frac{s_x^2}{n_x} + \frac{s_y^2}{n_y}}}$$

sp

$$Z_{obs} = \frac{53.1 - 50 - 0}{\sqrt{\frac{618}{85} + \frac{553}{85}}} = \frac{3.1}{3.71} = 0.835$$

c) $Z_\alpha = 1.6449$ (one sided test) (table 2)

hp

d) P-value = $P(Z > Z_{obs}) = 1 - P(Z < 0.835)$

or $= 1 - 0.7995 = 0.2005 = \text{P-value}$

e) * We reject H_0 if * $Z_{obs} > Z_{critical}$

hp

* or $P\text{-value} < \alpha$

f) Since $Z_{obs} = 0.835 < Z_c = 1.6449$

and $P\text{-value} = 0.2005 > \alpha = 0.05$

we fail to reject H_0 , There is no evidence that the grading is unfair and teacher A is more strict than teacher B

Uppg.nr.:
(Task no.)

Lärarens
kommentar:
(Teacher's
note)

Poäng:
(Points)