



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 0 4 - U F S		
Datum (Date YYYY-MM-DD)	2022-06-03	Plats nr. (Seat No.)	113

Kurs/Kurskod (Course/Course code)	STE101
Kursmoment (Course component)	

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

Direkt i skrivning: (kryss)		Svarsblankett: (kryss)	<input checked="" type="checkbox"/>	Lösa svarsblad: (antal)	2
Lämnat in blankt: (kryss)		Dator: (kryss)			

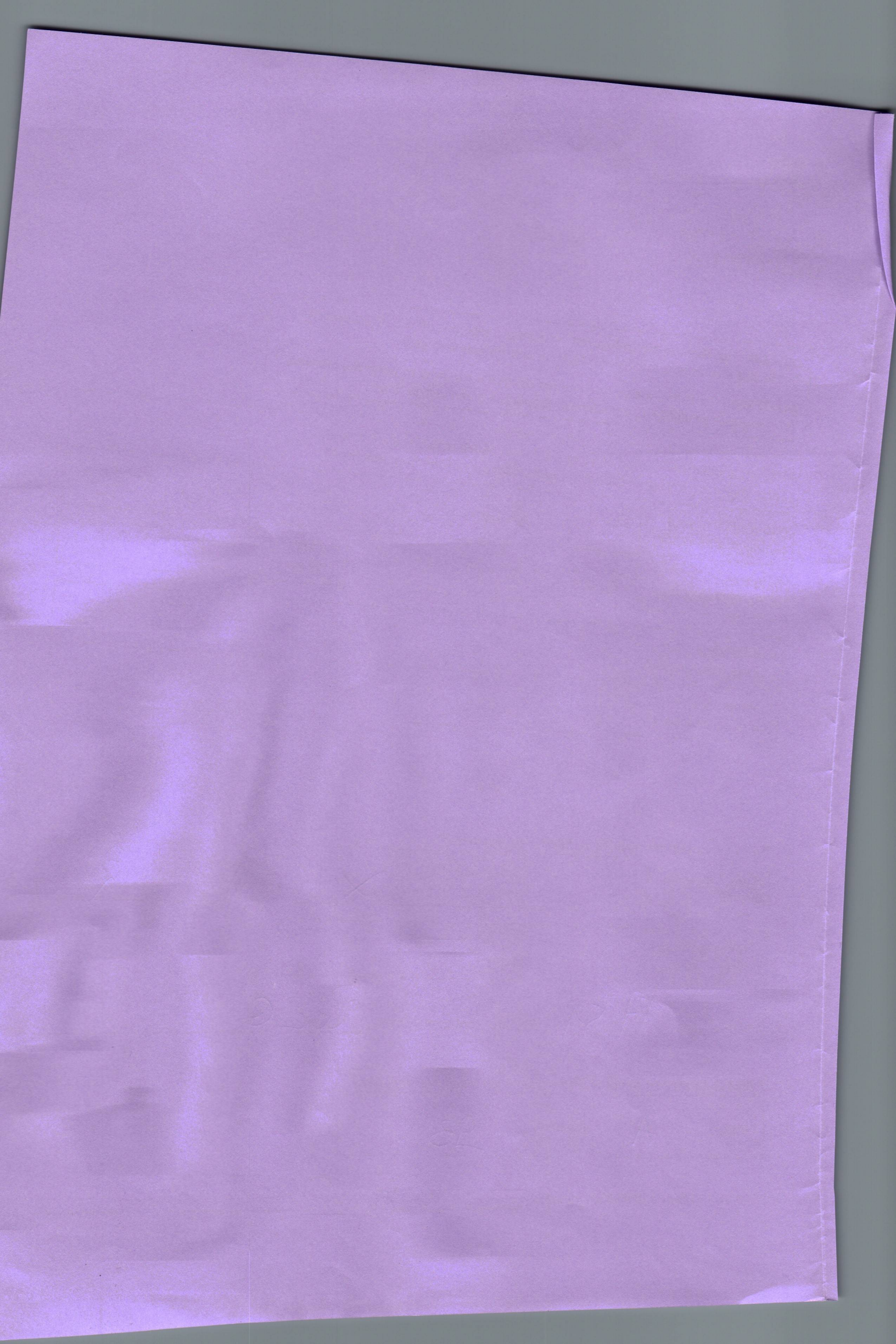
Inlämningstid: 17:59

Signatur tentamensvärd: Ewlg

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

Betyg:	A	Poäng:	93
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Signatur rättande lärare/examinator: E. Törnqvist





Stockholm University

BASIC STATISTICS FOR ECONOMISTS, STE101. ANSWER FORM

Department of statistics

2022-06-03

Room: Ugglevikssalen

Anonymity code: 311-0104-VFS

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	X
2			X		X
3				X	
4					X
5		X			
6	X				
7				X	
8		X			
9		X			
10	X				
11				X	
12		X			

a, $\mu_x = 63$ $\sigma_x^2 = 144$

$P(X \leq q1) = 0.25$, Using table 1 knowing that the students score follow a normal distribution we get that $P(X \leq q1) = 0.25 =$ the value 0.68
We are looking for $q1$, so below the mean. Then using Symetri we get -0.68.

$$-0.68 = \frac{X - 63}{\sqrt{144}} = X = 54.84 \quad q1 = 54.84 \checkmark$$

b, $P(X \geq q3) = 0.25$, Using table 1, we get the same value, 0.68.

$$0.68 = \frac{X - 63}{\sqrt{144}} = X = 71.16 \quad q3 = 71.16 \checkmark$$

c, IQR for the students score = $71.16 - 54.84 = 16.32 \checkmark$

$$\begin{aligned} \text{Outlier} &= q3 + \text{IQR} = 71.16 + 16.32 = 87.48 \checkmark \\ q1 - \text{IQR} &= 54.84 - 16.32 = 38.52 \checkmark \end{aligned}$$

$P(38.52 > X > 87.48)$ standardizing gives following

$$3P \quad P\left(\frac{38.52 - 63}{\sqrt{144}} > Z > \frac{87.48 - 63}{\sqrt{144}}\right) = P(-2.04 > Z > 2.04)$$

Using the symmetry we get

$$2P(Z > 2.04) = 2 \cdot (1 - 0.97932) = 0.04136 \approx 4.1\%$$

e, This is a bernoulli experiment with $n=10$ and $p=0.04$. Using Table 7 the Binomial distribution because $X \sim \text{Bm}(10; 0.04)$ we get:

3P $P(X \geq 1)$ can be written as $P(X > 0)$ given the variable is discrete.
 $P(X > 0) = 1 - 0.59874 = 0.40126 \approx 40\%$

(rounded the $p=0.04$ to $p=0.05$ in the table!

f, When approximating a binomial variable we get the following

$$\begin{aligned} 3P \quad \mu_x &= E(X) = n \cdot p = 0.04 \cdot 300 = 12 \checkmark \\ \sigma_x^2 &= \text{Var}(X) = n \cdot p \cdot (1-p) = 300 \cdot 0.04 \cdot (1-0.04) = 11.52 \checkmark \\ P(X > 20) &= P\left(Z > \frac{20 - 12}{\sqrt{11.52}}\right) = P(Z > 2.35) = 1 - 0.99041 = 0.00959 \end{aligned}$$

Uppg.nr.:
(Task no.)

Lärarens
kommentar:
(Teacher's
note)

Poäng:
(Points)



a, Hypotheses: $H_0: \mu_A = \mu_B$ vs $H_A: \mu_A < \mu_B$ ✓

2p H_0 : There is no difference in the scores
 H_A : There is a difference in the scores, A gives less points.

b, $Z = \frac{\bar{X} - \bar{Y} - D_0}{\sqrt{S_x^2/n_x + S_y^2/n_y}}$ ← Test statistic: ✓

2p Observed value:
$$\frac{53.1 - 50 - 0}{\sqrt{\frac{618}{85} + \frac{553}{85}}} = 0.835$$
 ✓

c, Critical value: The students claim that there is a difference (smaller or greater) so this is a one sided test
2p $\alpha = 0.05$ gives the value = 1.6449

d, The p-value is the smallest significance level that we can reject H_0 at. Given that the observed value is
2p 0.835, the p-value must be between 0.1 and 0.25 to be able to reject H_0 in this test.

4pe, Decision rule: Reject H_0 if $Z_{obs} > Z_{crit}$. ✓

f, Conclusion: We fail to reject the H_0 at the 5% significance level. This means that there is statistical evidence that the grading process is equal between
3p teacher A and B.

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kommentar:
(Teacher's
note)

Poäng:
(Points)