Stockholms universitet

Skriv din anonymiseringskod och dagens datum på allt material du lämnar in. (*Enter your anonymization code and todays date on all submitted materials*)													
Anonymiseringskod (*Anonymization code*)				-	0	1	2	1	-	Z	T	P
Datum (*Date* YYYY-MM-DD)	2022-08-15												

Kurs/Kurskod (*Course/Course code*)	STE101
Kursmoment (*Course component*)	Grundläggande statistik för ekonomer

Ifylls i av tentamensvärd (*To be filled in by invigilator*)

Direkt i skrivning: (kryss)		Svarsblankett: (kryss)	X	Lösa svarsblad: (antal)	2
Lämnat in blankt: (kryss)		Dator: (kryss)			

Inlämningstid: 12:21 Signatur tentamensvärd: HS

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

Betyg:	B	Poäng:	80

Signatur rättande lärare/examinator: E Torgny

Stockholm University

BASIC STATISTICS FOR ECONOMISTS, STE101. ANSWER FORM

Department of statistics

2022–08–15

Room: Värtasalen

Anonymity code: 0121 - ZTP

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		
✓ 5			X			
✓ 6			X			
✓ 7		X				
✓ 8					X	
9			X			X
✓ 10		X				
✓ 11					X	
✓ 12	X					

55/60

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Datum: (Date YYYY-MM-DD) 2022-08-15 | Kurs/Kurskod: (Course/Course code) STE101 | Sidnr.: (Page no.)

Anonymiseringskod (Anonymization code) - 0121 - ZTP

Uppg.nr.: (Task no.) 13

Lärarens kommentar: (Teacher's note)

a) We want to test if the frequency for each size is equal or not.

F = frequency

1p $H_0: F_{size1} = F_{size2} = F_{size3} = F_{size4} = F_{size5}$ ✓

$H_1: F_{size1} \neq F_{size2} \neq F_{size3} \neq F_{size4} \neq F_{size5}$ ×

The test statistics is

$$X^2 = \sum_{i=1}^{K} \frac{(O_i - E_i)^2}{E_i}$$ ✓ where $E_i = n P_i$

b) The critical value is

$$X^2_{crit} = X^2_{K-2;\alpha/2}$$

$K-2 = 5-2 = 3$

$\alpha/2 = 0{,}05/2 = 0{,}025$ × why $\alpha/2$?

2.5p $X^2_{3;0{,}025} = 9{,}348$ ×

Decision rule is: We reject the null hypothesis if $X^2_{obs} > X^2_{crit}$ ✓

Poäng: (Points) 6.5p

Tentamensservice/SU/typ_b

Uppg.nr.: (*Task no.*) 13

Lärarens kommentar: (*Teacher's note*)

c) $X^2 = \sum_{i=1}^{K} \frac{(O_i - E_i)^2}{E_i}$ $\quad E_i = nP_i$

$E_i = 200 \times \frac{1}{5} = 40$

GR

Size	1	2	3	4	5	
O_i	30	40	50	50	30	200
E_i	40	40	40	40	40	200
$O_i - E_i$	$30-40=-10$	$40-40=0$	$50-40=10$	$50-40=10$	$30-40=-10$	
$O_i - E_i^2$	$-10^2=100$	$0^2=0$	$10^2=100$	$10^2=100$	$-10^2=100$	
$\frac{O_i - E_i^2}{E_i}$	2,5	0	2,5	2,5	2,5	Σ 10

$X^2_{obs} = 10$ ✓

d) The observed value from the test statistics is = 10. Since the decision rule is that we reject the null hypothesis if $X^2_{obs} > X^2_{crit}$, we

GR can determine that the resort's claim that each size is equally frequent is rejectable at a 5% significance level.

$(10 > 9,348)$

Poäng: (*Points*) 10p

a) 50% of the students pass the exam

Random sample of $n=10$ was drawn

Let X be number of students passing the exam.

$P(X>5)$?

This is binominal distributed, $X \sim Bin(n,p)$

$n = 10$

$p = 0,5$ $\quad X \sim Bin(10, 0,5)$ ✓

$\mu_X = np = 10 \times 0,5 = 5$

$\sigma_X^2 = np(1-p) = 10 \times 0,5\,(1-0,5) = 2,5$

1p $\quad P(X>5) = 1 - P(X \leq 4)$

$= 1 - 0,37695 = 0,62305$

From table 7 we find that when $n=10$, $p=0,5$ and $x \leq 4$ we get 0,37695

$P(X \geq 5) = 0,62305$

Uppg.nr.: (*Task no.*) 14

Lärarens kommentar: (*Teacher's note*)

b) When n is large, the distribution can be approximated as normal according to the central limit theorem.

$n = 225$

$P(X > 112,5)$?

$\mu_X = 112,5$

$\sigma_X^2 = 56,25$

Since you can either pass or dont pass the exam, we cannot have 0,5 as a passed exam. ✓

Thus we need to look for:

$$P(X \geq 113) = 1 - P(X \leq 112) \checkmark$$

$$1 - P\left(Z \leq \frac{112 - 112,5}{\sqrt{56,25}}\right) = 1 - P(Z \leq 0,0666)$$

In table 1 we find that $P(Z \leq 0,0666)$ is $\approx 0,52790$

$$1 - 0,52790 = 0,47210$$

$$P(X \geq 113) = 0,47210 \checkmark$$

Poäng: (*Points*) 5p