



UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2019/2020

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 406: APPLIED STOCHASTIC PROCESSES

DATE: JANUARY 15, 2020

TIME: 2.00. P.M. – 4.00. P.M.

INSTRUCTION: Answer Question ONE and any other Two Questions

Question One (30 Marks)

a)

- i. Define each of the following examples of a stochastic process
 - A symmetric simple random walk
 - A compound Poisson process(3 Marks)
- ii. For each of the process in (i), classify it as a stochastic process according to its state space and the time that it operates on(3 Marks)

- b) Let (Ω, \mathcal{F}, P) be a probability space. For a symmetric random walk

$$M_k = \sum_{i=1}^k Z_i$$

With starting point at $M_0 = 0$, $P(Z_i = 1) = P(Z_i = -1) = \frac{1}{2}$, show that M_k is a martingale(6 Marks)

- c) Let $(W_t)_{t \geq 0}$ be a standard Wiener process

- i. Set $(Y_t)_{t \geq 0}$ to be the process $Y_t = \mu t + \sigma W_t$. Find the distribution of Y_t for $\mu = 0$ and for $\mu \neq 0$.(4 Marks)
- ii. Compute $E[(Y_6 - Y_2) Y_1]$ for $\mu = 0.1$ and $\sigma = 0.4$.(4 Marks)

d)

- i. Let (Ω, \mathcal{F}, P) be a probability space and let $\{W_t : t \geq 0\}$ be a standard Wiener process.
Prove that

$$\int_0^t W_s^2 dW_s = \frac{1}{3} W_t^3 - \int_0^t W_s ds \quad (5 \text{ Marks})$$

- ii. Let $\{W_t\}_{t \geq 0}$ be a Wiener Process. Show that $E[(W_t - W_s)^4] = 3(t-s)^2$. (5 Marks)

Question Two (20 Marks)

- a) Define a martingale process. Hence or otherwise show that $e^{W(t)}e^{-t/2}$ is a martingale and find the differential equation it satisfies. (8 Marks)
- b) i. Let (Ω, \mathcal{F}, P) be a probability space and let $\{W_t : t \geq 0\}$ be a standard Wiener process. For a constant θ find the SDE for the random process $X_t = e^{\theta W_t - \frac{1}{2}\theta^2 t}$. (8 Marks)
- ii. By writing the SDE in integral form calculate $E(e^{\theta W_t})$ (4 Marks)

Question Three (20 Marks)

- a) Suppose that X satisfies the SDE $dX_t = \alpha X_t dt + \sigma X_t dW_t$, and Y satisfies $dY_t = \gamma X_t dt + \delta Y_t dW_t$. Note that now both X and Y are driven by the same Wiener process W . Define Z by $Z = \frac{X}{Y}$ and derive an SDE for Z . (6 Marks)
- b) i. Solve $dR(t) = (\alpha - \beta R(t))dt + \sigma \sqrt{R(t)}dW(t)$. (6 Marks)
- ii. Compute i) $E(R(t))$ ii) $Var(R(t))$ (8 Marks)

Question Four (20 Marks)

- a) Let $\{W(t)\}$ be a standard Brownian motion. You are given:
- $U(t) = 2W(t) - 2$
 - $V(t) = [W(t)]^2 - t$
 - $Z(t) = W^2(t) - 2 \int_0^t sZ(s) ds$
- Find if the processes defined above has / have zero drift? (6 Marks)
- b) Let (Ω, \mathcal{F}, P) be a probability space and $\{W_t : t \geq 0\}$ be a standard Wiener process. Show that $B_t = W_{t+u} - W_u$, $u > 0$ is also a standard Wiener process. (7 Marks)

- c) The stochastic process $\{R(t)\}$ is given by

$$R(t) = R(0)e^{-t} + 0.05(1 - e^{-t}) + 0.1 \int_0^t e^{s-t} \sqrt{R(s)} dW(s),$$

where $\{W(t)\}$ is a standard Brownian motion. Define $X(t) = [R(t)]^2$.

Find $dX(t)$.

(7 Marks)

Question Five (20 Marks)

- a) Let $\{N_t : t \geq 0\}$ be a Poisson process with intensity $\lambda > 0$ defined on the probability space (Ω, \mathcal{F}, P) with respect to the filtration F_t .
- i. By defining the compensated Poisson process, $\hat{N}_t = N_t - \lambda t$ show that \hat{N}_t is a martingale. (3 Marks)
 - ii. By defining the compensated Poisson process, $\hat{N}_t^2 = N_t^2 - \lambda t$ show that $\hat{N}_t^2 - \lambda t$ is a martingale. (6 Marks)
- b) Let $\{N_t : t \geq 0\}$ be a Poisson process with intensity $\lambda > 0$ defined on the probability space (Ω, \mathcal{F}, P) with respect to the filtration F_t . Let X_1, X_2, \dots be a sequence of independent and identically distributed random variables with common mean $E(X_i) = E(X) = \mu$ and variance $Var(X_i) = Var(X) = \sigma^2$. Let X_1, X_2, \dots be independent of N_t . By defining the compound Poisson process M_t as $M_t = \sum_{i=1}^{N_t} X_i$, $t \geq 0$ and assuming $E(|X|) < \infty$, show that the compensated compound Poisson process $\hat{M}_t = M_t - \mu \lambda t$ is a martingale. (6 Marks)



UNIVERSITY OF NAIROBI

SECOND SEMESTER EXAMINATIONS 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND BACHELOR OF ECONOMICS AND STATISTICS

STA 406: APPLIED STOCHASTIC PROCESSES

DATE: JUNE 7, 2019

TIME: 11.30 A.M. – 1.30 P.M.

INSTRUCTION: Answer Question ONE and any other Two Questions

Question 1 (30 Marks)

- a) Let (Ω, \mathcal{F}, P) be a probability space and let $\{W_t : t \geq 0\}$ be a standard Wiener process. For a constant θ ,

- show that $X_t = e^{\theta W_t - \frac{1}{2}\theta^2 t}$ is a martingale (4 Marks)
- find the SDE for the random process $X_t = e^{\theta W_t - \frac{1}{2}\theta^2 t}$. (4 Marks)
- By writing the SDE in integral form calculate $E(e^{\theta W_t})$ (4 Marks)

- b) Let $\{Z(t)\}$ be a standard Brownian motion. You are given:

- $U(t) = 2Z(t) - 2$
- $V(t) = [Z(t)]^2 - t$
- $W(t) = t^2 Z(t) - 2 \int_0^t s Z(s) ds$

Which of the processes defined above has / have zero drift? (6 Marks)

- c) Consider the stochastic differential equation:

$$dX(t) = \lambda[\alpha - X(t)]dt + \sigma dZ(t), \quad t \geq 0,$$

where λ , α and σ are positive constants, and $\{Z(t)\}$ is a standard Brownian motion.

The value of $X(0)$ is known. Find a solution. (6 Marks)

$$\lim_{T \rightarrow \infty} \frac{dx}{T} = -\lambda dt$$

- d) The stochastic process $\{R(t)\}$ is given by

$$R(t) = R(0)e^{-t} + 0.05(1 - e^{-t}) + 0.1 \int_0^t e^{s-t} \sqrt{R(s)} dZ(s),$$

where $\{Z(t)\}$ is a standard Brownian motion. Define $X(t) = [R(t)]^2$. Find $dX(t)$.

(6 Marks)

Question Two (20 Marks)

- a) Let $M_t = \int_0^t f(s) dW_s$, and show that the SDE satisfied by

$X_t = \exp\{\theta M_t - \frac{1}{2} \theta^2 \int_0^t f(s)^2 ds\}$ is $dX_t = \theta f(t) X_t dW_t$, and show also that

$$M_t \sim N\left(0, \int_0^t f(s)^2 ds\right). \quad (8 \text{ Marks})$$

- b) Let (Ω, \mathcal{F}, P) be a probability space and let $\{W_t : t \geq 0\}$ be a standard Wiener process. Suppose X_t follows the Ornstein-Uhlenbeck process with SDE $dX_t = k(\theta - X_t) dt + \sigma dW_t$, where k, θ and σ are constants.

- i. Find expression for X_T , $t < T$. (6 Marks)
- ii. Using the properties of stochastic integrals on the above expression, find the mean and variance of X_T . (6 Marks)

Question Three (20 Marks)

- a) Consider two non-dividend-paying assets X and Y . There is a single source of uncertainty which is captured by a standard Brownian motion $\{Z(t)\}$. The prices of the assets satisfy the stochastic differential equations

$$\frac{dX(t)}{X(t)} = 0.07dt + 0.12dZ(t)$$

and

$$\frac{dY(t)}{Y(t)} = Adt + BdZ(t),$$

Where A and B are constants.

You are also given:

i. $d[\ln Y(t)] = \mu dt + 0.085 dZ(t);$

ii. The continuously compounded risk-free interest rate is 4%.

Determine B .

(6 Marks)

- b) Let $x(t)$ be the dollar/euro exchange rate at time t . That is, at time t , $\text{€}1 = \$x(t)$.

Let the constant r be the dollar-denominated continuously compounded risk-free interest rate. Let the constant r_e be the euro-denominated continuously compounded risk-free interest rate.

You are given

$$\frac{dx(t)}{x(t)} = (r - r_e)dt + \sigma dZ(t),$$

where $\{Z(t)\}$ is a standard Brownian motion and σ is a constant. Let $y(t)$ be the euro/dollar exchange rate at time t . Thus, $y(t) = 1/x(t)$. Derive the dynamics, $dy(t)$.

(6 Marks)

- c) Let $\{B_t\}_{t \geq 0}$ be a one-dimensional Brownian motion. Solve the following stochastic differential equation, where a and b are real constants:

$$dX_t = \frac{b - X_t}{1-t} dt + dB_t, \quad 0 \leq t < 1, \quad X_0 = a. \quad (8 \text{ Marks})$$

✓ Question Four (20 Marks)

- a) Consider the stochastic differential equation

$$dX(t) = -3X(t)dt + 2dZ(t),$$

Where $\{Z(t)\}$ is a standard Brownian motion.

You are given that a solution is $X(t) = e^{-At} \left[B + C \int_0^t e^{Ds} dZ(s) \right]$,

Where A , B , C and D are constants. Calculate the sum $A+C+D$. (6 Marks)

b)

- i. State the five key features of a standard Wiener Process W_t . (5 Marks)
- Consider a stochastic differential equation
- $$dX_t = Y_t dW_t + A_t dt, \text{ where } A_t \text{ is a deterministic process and } Y_t \text{ is a process adapted to the natural filtration of } W_t.$$
- ii. Write down Ito's lemma for $f(t, X_t)$, where f is a suitable function. (3 Marks)
- iii. Determine $df(t, X_t)$ where $f(t, X_t) = e^{2tX_t}$. (3 Marks)

Question Five (20 Marks)

- a) Let $\{N_t : t \geq 0\}$ be a Poisson process with intensity $\lambda > 0$ defined on the probability space (Ω, \mathcal{F}, P) with respect to the filtration \mathcal{F}_t .
- By defining the compensated Poisson process, $\hat{N}_t = N_t - \lambda t$ show that \hat{N}_t is a martingale. (8 Marks)
 - By defining the compensated Poisson process, $\hat{N}_t = N_t - \lambda t$ show that $\hat{N}_t^2 - \lambda t$ is a martingale. (6 Marks)
- b) Let $\{N_t : t \geq 0\}$ be a Poisson process with intensity $\lambda > 0$ defined on the probability space (Ω, \mathcal{F}, P) with respect to the filtration \mathcal{F}_t . Let X_1, X_2, \dots be a sequence of independent and identically distributed random variables with common mean $E(X_i) = E(X) = \mu$ and variance $Var(X_i) = Var(X) = \sigma^2$. Let X_1, X_2, \dots be independent of N_t . By defining the compound Poisson process M_t as
- $$M_t = \sum_{i=1}^{N_t} X_i, t \geq 0 \quad \text{and assuming } E(|X|) < \infty, \text{ show that the compensated compound Poisson process } \hat{M}_t = M_t - \mu \lambda t \text{ is a martingale.} \quad (6 \text{ Marks})$$

UNIVERSITY OF NAIROBI
CONTINUOUS ASSESSMENT TEST

STA 406: Applied Stochastic Processes

DATE: 16 May, 2019

TIME: 2 Hours

INSTRUCTION: Answer ALL Questions

Question 1 (30 Marks)

- a) Let (Ω, \mathcal{F}, P) be a probability space and let $\{W_t : t \geq 0\}$ be a standard Wiener process. For a constant θ ,

i. show that $X_t = e^{\theta W_t - \frac{1}{2}\theta^2 t}$ is a martingale (4 Marks) ✓

ii. find the SDE for the random process $X_t = e^{\theta W_t - \frac{1}{2}\theta^2 t}$ (4 Marks) ✓

iii. By writing the SDE in integral form calculate $E(e^{\theta W_t})$ (3 Marks) ✓

- b) Let $M_t = \int_0^t f(s) dW_s$ and show that the SDE satisfied by $X_t = \exp\{\theta M_t - \frac{1}{2} \theta^2 \int_0^t f(s)^2 ds\}$ is $dX_t = \theta f(t) X_t dW_t$ and show also that $M_t \sim N\left(0, \int_0^t f(s)^2 ds\right)$. (7 Marks)

- c) The stochastic process $\{R(t)\}$ is given by

$$R(t) = R(0) e^{-t} + 0.05(1 - e^{-t}) + 0.1 \int_0^t e^{s-t} \sqrt{R(s)} dZ(s),$$

where $\{Z(t)\}$ is a standard Brownian motion. Define $X(t) = [R(t)]^2$. Find $dX(t)$. (6 Marks)

- d) Consider the stochastic differential equation

$$dX(t) = -3X(t) dt + 2 dZ(t),$$

Where $\{Z(t)\}$ is a standard Brownian motion.

You are given that a solution is $X(t) = e^{-At} \left[B + C \int_0^t e^{Ds} dZ(s) \right]$,

Where A, B, C and D are constants. Calculate the sum A+C+D. (6 Marks) ✓

UNIVERSITY OF NAIROBI

SECOND SEMESTER EXAMINATIONS - 2014/2015
(MODULE D)

EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 406 : APPLIED STOCHASTIC PROCESSES

DATE: APRIL 13, 2015

TIME: 9.00 A.M. - 11.00 A.M.

INSTRUCTIONS:

Answer question ONE and any other TWO questions.

Question 1 : (30 marks).

- a) Consider the following six levels of No-claims Discount system

Level 0	-	0% discount
Level 1	-	20% discount
Level 2	-	25% discount
Level 3	-	35% discount
Level 4	-	45% discount
Level 5	-	50% discount

At the end of each policy year, policy-holders change levels according to the following rules:

- * A policy-holder who has made no claim during a policy year moves to the next higher discount level or remains at 50% if already at the highest level with probability p_o .
- * A policyholder who has made at least one claim during a policy year drops back to zero percent level with probability $1 - p_o$.

- i) Draw a transition graph for this system.
- ii) Write down the transition matrix.
- iii) Obtain the invariant distribution $\{\pi_i\}$ for $i=0,1,2,3,4$ and 5.

- iv) Determine the average yearly premium paid denoted by $A(p_o, m)$ and is given by the formula

$$\Delta(p_e, m) = m \sum_{i=0}^5 [\pi_i \text{ times } (\% \text{ discount at level } i)],$$

where m is the yearly amount of premium

- b) i) Let $0 < p < 1$ and $p + q = 1$

By equating $p^n - q^n = (p^n - q^n)(p + q)$ express $p^{n+1} - q^{n+1}$ in terms of $p^n - q^n$ and $p^{n-1} - q^{n-1}$ for $n = 1, 2, 3, \dots$

ii) If $G(s) = q \frac{p-q}{(p^2 - q^2) - (p-q)ps}$

find $G_2(s)$ and $G_3(s)$ using the information given in (i) and the fact that $p^2 - q^2 = p + q$

- iii) Given that

$$G_n(s) = q \frac{(p^n - q^n) - (p^{n-1} - q^{n-1})ps}{(p^{n+1} - q^{n+1}) - (p^n - q^n)ps}$$

show that it can be re-written as

$$G_n(s) = \frac{(m^n - 1) - (m^{n-1} - 1)ms}{(m^{n+1} - 1) - (m^n - 1)ms}$$

where $m = \frac{p}{q}$

- c) i) What are two ways of expressing total progeny Y_n ?

ii) What are their differences?

iii) Use the two expressions to obtain $E(Y_n)$

- d) From the basic difference-differential equations for a simple birth process, the solution can be given in terms of a pgf $G(s, t)$ as

$$G(s, t) = \left(\frac{se^{-\lambda t}}{1 - (1 - e^{-\lambda t})s} \right)^i$$

which is a pgf of a negative binomial distribution with $p=e^{-\lambda}$.

Find

i) $p_n(t)$ = the coefficient of s^n

ii) $E[X(t)] = \frac{\partial G}{\partial s}$ when $s=1$.

Question 2 (20 marks)

- a) Let $\pi_0, \pi_1, \pi_2, \dots$ be a set of probabilities that a man has no sons, one son, two sons, etc. The probability generating function of this sequence is given by $G(s) = \pi_0 + \pi_1 s + \pi_2 s^2 + \dots$
- Write down the pgf which will help us to study the probability distribution of this man's grandsons.
 - If we consider the sons of the man as the first generation, his grandsons as the second generation and so on, find the probability that the process terminates at or before the nth generation.
- b) Assuming the series $\pi_0, \pi_1, \pi_2, \dots$ to be of geometric progression form with common ratio; i.e., $\pi_0 = \pi, \pi_1 = \pi g, \pi_2 = \pi g^2, \dots$ find the probability of extinction in this case.

Question 3 (20 marks)

A drunkard walks along a four-block stretch of Park Avenue. If he is at corner 1, 2 or 3, then he walks to the left or right with equal probability. He continues until he reaches corner 4, which is a bar, or corner 0, which is his home. If he reaches either home or the bar, he stays there.

- Form a Markov chain with states 0, 1, 2, 3 and 4.
 - Draw the transition graph
- Re-organize the transition matrix to be of the form

$$P = \begin{bmatrix} I & O \\ R & Q \end{bmatrix}$$

where I is a 2×2 identity matrix.

What is R and Q ?

- Find an expression for $\lim_{n \rightarrow \infty} P^n$ and apply it to this absorbing matrix.

Question 4 (20 marks)

The basic difference-differential equations for a simple birth process are:

$$p_0^1(t) = 0 \quad (1)$$

and

$$p_n^1(t) = -n\lambda p_n(t) + (n-1)\lambda p_{n-1}(t) \text{ for } n=1, 2, \dots \quad (2)$$

a) Use the iteration technique to solve for $p_n(t)$ given that $X(0)=i$

b) Multiply (2) by n and then sum the result over n . Let $M_1(t)$

$$M_1(t) = \sum_{n=1}^{\infty} np_n(t) \text{ and } M_2(t) = \sum_{n=1}^{\infty} n^2 p_n(t)$$

$$\text{Also let } M'_1(t) = \frac{d}{dt} M_1(t) = \sum_{n=1}^{\infty} np'_n(t)$$

$$\text{Solve for } M_1(t) = E[X(t)]$$

c) Next, multiply (2) by n^2 and the sum the result over n .

$$\text{In addition to } M_1(t) \text{ and } M_2(t), \text{ define } M_3(t) = \sum_{n=1}^{\infty} n^3 p_n(t)$$

$$\text{and } M'_2(t) = \sum_{n=1}^{\infty} n^2 p'_n(t)$$

$$\text{Solve for } M_2(t)$$

Then obtain

$$\text{Var}[X(t)] = M_2(t) - [M_1(t)]^2$$

Question 5 (20 marks)

Classify the states

	E1	E2	E3	E4	E5	E6	E7	E8	E9
E1	1	0	0	0	0	0	0	0	0
E2	0	0	1	0	0	0	0	0	0
E3	0	1	0	0	0	0	0	0	0
E4	0	0	0	1	0	0	0	0	0
E5	0	0	0	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{24}$	0	0	0
E6	0	0	0	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	0	0	0
E7	0	0	0	0	0	0	0	$\frac{1}{3}$	$\frac{1}{3}$
E8	0	0	0	0	0	0	$\frac{2}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
E9	0	0	0	0	0	0	$\frac{1}{2}$	$\frac{1}{2}$	0

Find the asymptotic behaviour, i.e., $\lim_{n \rightarrow \infty} P^n$

limit? Let's see!

- c) i) Classify the states of the discrete-time Markov Chain with state space $S = \{1, 2, 3, 4\}$ and transition matrix

$$\begin{pmatrix} \frac{1}{3} & \frac{2}{3} & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ \frac{1}{4} & 0 & \frac{1}{4} & \frac{1}{4} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

- ii) Calculate $f_{34}^{(n)}$ and $\sum_n f_{34}^{(n)}$

Question 2 (20 marks)

In a pure birth process with linear birth $\lambda_n = n\lambda$, let the initial number be geometrically distributed; i.e.,

$$p_n(0) = \text{Prob}\{X(0)=n\} = (1-\rho)\rho^{n-1}, \quad n=1, 2, 3, \dots$$

Find

$$E[X(t)] \text{ and } \text{Var}[X(t)]$$

Question 3 (20 marks)

Find the differential equation in probability generating function for a birth process when

a) $\lambda_n = \frac{\lambda + \lambda a n}{1 + \lambda a t}, \quad n=0, 1, 2, \dots$

b) $\lambda_n = \lambda^n, \quad n=0, 1, 2, \dots$

c) $\lambda_n = \lambda n^2, \quad n=0, 1, 2, \dots$

Question 4 (20 marks)

A particle moves on a circle through points which have been marked 0, 1, 2 (in a clockwise order). At each step it has a probability p of moving to the right (clockwise) and $q = 1 - p$ to the left (counter-clockwise), where $0 < p < 1$.

Let X_n denote its location on the circle after the n th step. The process $\{X_n, n \geq 0\}$ is a Markov Chain

- a) Find the transition probability matrix
- b) Draw the transition diagram
- c) Find the probability of returning to a state in n steps for the first time where $n=1, 2, 3, 4, 5, 6, 7, \dots$
- d) Determine the period of the states
- e) Calculate the limiting probabilities
- f) What is the expected number of steps the particle takes to return to the starting position

Question 5 (20 marks)

- a) If

$$P = \begin{bmatrix} I & 0 \\ R & Q \end{bmatrix}$$

where I is an identity matrix, Find P^n and $\lim_{n \rightarrow \infty} P^n$

- b) Apply the formula for $\lim_{n \rightarrow \infty} P^n$ to the following transition matrix

$$P = \begin{bmatrix} \frac{1}{4} & 0 & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & 0 & 0 & 1 & 0 \\ 0 & \frac{1}{4} & 0 & \frac{1}{4} & \frac{1}{2} \end{bmatrix}$$

UNIVERSITY OF NAIROBI

MODULE II DEGREE PROGRAMME - 2013/2014

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ARTS IN
ECONOMICS AND STATISTICS

STA 406: APPLIED STOCHASTIC PROCESSES

DATE: APRIL 16, 2014

TIME: 6.00 P.M - 8.00 P.M

INSTRUCTIONS:

Answer question ONE and any other TWO questions.

Question 1 (30 marks)

- (a) Determine the probability generating function (pgf) and hence find the mean and variance of the Bernoulli distribution. (6 marks)

- (b) Use the conditional expectation approach to show that

$$\text{Var}(S_n) = E(N) \text{Var}(X_1) + [E(X_1)]^2 \text{Var}(N) \quad (4 \text{ marks})$$

- (c) Show that the mgf $Q_n(s) = E(c^{Z_1^n})$, $n = 1, 2, 3, \dots$, satisfies the relation

$$Q_{n+1}(s) = G[Q_n(s)] \text{ where } G(s) \text{ is the pgf of } Z_1. \quad (5 \text{ marks})$$

- (d) The relationship between $f_n^{(t)}$ and $f_n^{(0)}$ is given by

$$f_n^{(t)} = \sum_{j=1}^{n-1} f_n^{(t-1)} f_j^{(0)}, t \geq 2; n \geq 1$$

Express this relationship in terms of generating function. (5 marks)

- (e) In the branching process, using the first generation as the reference point, the size of n -th generation is expressed as

$$Z_n = Z_{n-1}^{(0)} + Z_{n-1}^{(1)} + \dots + Z_{n-1}^{(n)}$$

where Z_1 is the size of the first generation.

Find $G_n(s)$ if $G(s)$ is the pgf of Z_1 . (5 marks)

- (f) Show that the basic difference-differential equation for the general pure birth process where $n=0$ is

$$P_n'(t) = -\lambda_n P_n(t) \quad (5 \text{ marks})$$

Question 2 (20 marks)

Let $S_N = X_1 + X_2 + \dots + X_N$ where the X_i 's are independent and identically distributed (iid) random variables and N is also a random variable independent of the X_i 's.

Use the pgf technique to show that

$$(a) E(S_N) = E(N) E(X_i)$$

$$(b) \text{Var}(S_N) = E(N)\text{Var}(X_i) + [E(X_i)]^2 \text{Var}(N)$$

Question 3 (20 marks)

The basic difference-differential equations for some waiting line problem is given by

$$P_n'(t) = -\lambda_n P_n(t), \quad n=0$$

and

$$P_n'(t) = -\lambda P_n(t) + \lambda P_{n-1}(t), \quad n \geq 1$$

Use Fellers' method to find $E(X_i)$ and $\text{Var}(X_i)$ given the initial condition $X(0) = 0$.

Question 4 (20 marks)

Determine the pgf, mean and variance of the Poisson distribution.

- (a) Determine the pgf, mean and variance of the Poisson distribution.
- (b) Use the expectation approach to show that the sum of Bernoulli independent and identically distributed (iid) random variables is Binomial.

$$\lambda^n t^n e^{-\lambda} \cdot b^n \cdot (1-p)^{n-k} \cdot p^k = \left(1 + p - 1\right)^n \cdot \binom{n}{k}$$

$$E(\lambda^n) \cdot E(b^n)$$

Question 5

(2 marks)

- (a) Let Z_n be the population size of the n^{th} generation and Y_n be the total population from the zeroeth generation upto and including the n^{th} generation. $G(s)$ denotes the pgf of the first generation and $R_n(s)$ is the pgf of Y_n .

- Show that $R_n(s) = SG[R_{n-1}(s)]$.
- Hence or otherwise, if $\mu = E(Z_1)$, obtain $E(Y_n)$ for $\mu \neq 1$ and $\mu = 1$.

- (b) Let

f_n = the probability that a pattern is completed for the first time at the n^{th} trial.

and

U_n = the probability that the pattern is completed at the n^{th} trial not necessarily for the first time.

- Find the relationship between U_n and f_n .

- If $U(s) = \sum_{n=0}^{\infty} U_n s^n$ and $F(s) = \sum_{n=0}^{\infty} f_n s^n$, show that

$$\text{that } U(s) = \frac{1}{1 - F(s)}$$

- By expanding $\frac{1}{1 - F(s)}$, find the relationship between $U(s)$ and $F(s)$.

Hence prove that

$$U_n = \sum_{r=0}^n f_n^{(r)} \text{ for } n > r.$$



UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2019/2020

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 432 : APPLIED ECONOMETRICS

DATE: JANUARY 8, 2020

TIME: 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS

1. Attempt Question ONE and any other TWO questions.
2. Show all your workings
3. All hypothesis should be tested at the 5% level of significance, unless otherwise specified.
4. Statistical TABLES ARE ATTACHED

Question 1 : (30 marks)

* a) Give an example of a multiple linear regression model with three explanatory variables (1 mark)

* b) State any three assumptions about the error term in the classical multiple linear regression model. (3 marks)

c) Consider the linear regression model

$$\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EXPER} + u$$

where WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term. Obtain the respective normal equations. (6 marks)

d) Consider the linear regression model $\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EXPER} + u$ where WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term. Based on a random sample of 103 observations, the model is estimated by ordinary least squares and the following results obtained:

β_j is interpreted as unit by which the value of y changes on average as a result of changing x_j by one unit, holding the values of other explanatory variables included in regression model constant.

$$\widehat{\text{WAGE}} = -9.878 + 1.925 \text{EDUC} + 0.141 \text{EXPER}$$

$$\text{Var}(\hat{\beta}) = \begin{bmatrix} 41.2909 & -2.33702 & -0.306253 \\ -2.33702 & 0.167693 & 0.0020664 \\ -0.306253 & 0.0020664 & 0.0105553 \end{bmatrix}$$

$$\text{RSS} = 14528.41, R^2 = 0.189739$$

- i) Interpret the estimated coefficient of EDUC. A one year increase in education increases wage by $+1.925$ on avg, holding years of experience constant.
- ii) Interpret the R^2 of the model. 18.9739% of variation in wage is explained by the independent variables yr of education and years of experience.
- iii) Construct a 95% confidence interval for β_3 .
 $s.e = \sqrt{0.0105553}$ (5 marks)
- iv) Test the following hypothesis:
 $H_0: \beta_2 \geq 0$ (5 marks)
 $H_a: \beta_2 < 0$
- v) Test the overall significance of the model (5 marks)

Question 2 : (20 marks)

- (a) Consider the regression model: $\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EDUC}^2 + \beta_4 \text{EXPER} + u$ where WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term.

Based on a random sample of 124 observations, the following results are obtained:

$$\widehat{\text{WAGE}} = 0.111 + 0.421 \text{EDUC} + 0.067 \text{EDUC}^2 + 0.081 \text{EXPER}$$

$$\text{RSS} = 15102.01; R^2 = 0.222538$$

$$\text{Var}(\hat{\beta}) = \begin{bmatrix} 121.296 & -15.5082 & 0.512666 & -0.286664 \\ -15.5082 & 2.26565 & -0.0813795 & 0.0131728 \\ 0.512666 & -0.0813795 & 0.00311842 & -0.00029457 \\ -0.286664 & 0.0131728 & -0.00029457 & 0.00624474 \end{bmatrix}$$

Based on the same data set, the following additional results are obtained.

$$\widehat{\text{WAGE}} = 3.82 + 0.25 \text{EDUC} + 0.07 \text{EDUC}^2; \text{ RSS} = 15233.57$$

$$\widehat{\text{WAGE}} = 21.58 + 0.004 \text{EXPER}; \text{ RSS} = 19424.50$$

- i) Test the statistical significance of β_4 using both the t-test and the F-test (8 marks)
- ii) Test whether education influences wages after controlling for experience (5marks)
- b) Consider the linear regression model: $\text{WAGE} = \beta_0 + \beta_1 \text{EDUC} + \beta_2 \text{EXPER} + u$
 where WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term.

Based on a random sample of 126 observations, consisting of 52 female workers and 74 male workers, we estimate the model based on the full sample, the female sub-sample, and the male sub-sample.

The following results are obtained.

$$\widehat{\text{WAGE}} = -8.16 + 1.57 \text{EDUC} + 0.18 \text{EXPER}; n = 126; \text{RSS} = 9206.730$$

$$\widehat{\text{WAGE}} = -22.86 + 2.60 \text{EDUC} + 0.14 \text{EXPER}; n = 52; \text{RSS} = 3343.415$$

$$\widehat{\text{WAGE}} = -2.03 + 1.07 \text{EDUC} + 0.24 \text{EXPER}; n = 74; \text{RSS} = 5181.161$$

Test whether we should pool the data for female workers and male workers when estimating the model. (7 marks)

Question 3 : (20 marks)

- a) State two properties of restricted least squares estimators. (4 marks)
- * Classify the following linear regression models as either linear-in-variables, log-linear, log-lin, lin-log, or polynomial (5 marks)

In $\text{WAGE} = \beta_0 + \beta_1 \ln \text{EDUC} + \beta_2 \ln \text{EXPER} + u \rightarrow \text{Log Log | Log-linear}$

$\text{WAGE} = \beta_0 + \beta_1 \text{EDUC} + \beta_2 \text{EXPER} + u \rightarrow \text{linear-in-variables}$

In $\text{WAGE} = \beta_0 + \beta_1 \text{EDUC} + \beta_2 \text{EXPER} + u \rightarrow \text{log-lin}$

$\text{WAGE} = \beta_0 + \beta_1 \text{EDUC} + \beta_2 \text{EDUC}^2 + \beta_3 \text{EXPER} + u \rightarrow \text{Polynomial}$

$\text{WAGE} = \beta_0 + \beta_1 \ln \text{EDUC} + \beta_2 \ln \text{EXPER} + u \rightarrow \text{Lin - Log}$

In each model WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term.

(c) Consider the linear regression model: $\text{WAGE} = \beta_1 + \beta_2 \ln \text{EDUC} + \beta_3 \ln \text{EXPER} + u$ where WAGE is hourly wage in US\$, EDUC is years of education, EXPER is years of experience and u is a random error term.

Based on a random sample of 100 observations, the model is estimated and the following results obtained:

$$\widehat{\text{WAGE}} = -88.539 + 36.780 \ln \text{EDUC} + 4.338 \ln \text{EXPER}$$

A one percent increase in years of experience increase wage by ~~unseen~~ 4.338% (3 marks)

Interpret the estimated value of β_3 on average holding years of education constant.

(d) Consider the linear regression model:

$$\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EDUC}^2 + \beta_4 \text{EXPER} + u \text{ where WAGE is hourly wage in US$, EDUC is years of education, EXPER is years of experience and } u \text{ is a random error term.}$$

Based on a random sample of 100 observations, the model is estimated and the following results obtained:

$$\widehat{\text{WAGE}} = -22.2 - 0.27 \text{EDUC} + 0.11 \text{EDUC}^2 + 0.17 \text{EXPER}$$

What is the marginal effect of education on wages at 10 years of education? (5 marks)

$$\frac{\partial \text{WAGE}}{\partial \text{EDUC}} = -0.27 + 0.22 \text{EDUC} = -0.27 + 0.22(10) = 2.47.$$

* Two marginal effect show diminishing returns to scale (3 marks)

State three things that model choice entails.

Question 4 : (20 marks)

a) What guides the choice of regressors and functional form in a regression model? (2 marks)

b) State two common reasons for omitting an important explanatory variable from a regression model (2 marks)

c) Consider the following models:

$$\text{FAMINC} = \beta_1 + \beta_2 \text{HE} + \beta_3 \text{WE} + \beta_4 \text{KL6} + u$$

$$\text{FAMINC} = \alpha_1 + \alpha_2 \text{WE} + \alpha_3 \text{KL6} + u$$

Where FAMINC is annual family income in dollars, HE is husband's years of education, WE is wife's years of education, and KL6 is the number of children less than 6 years old.

Based on a random sample of 100 observations, we estimate the two models and obtain the following results:

	Model 1	Model 2
CONSTANT	2692 (16450)	8664 (16670)
HE	2754 (1065)	
WE	3691 (1558)	5815 (1318)
KL6	-9095 (6154)	-8896 (6305)
n	100	100

Standard error in parentheses

It can further be shown that the pairwise correlation between HE and WE is given by $\text{corr}(\text{HE}, \text{WE}) = 0.5651$.

It can also be shown that the standard deviation of HE is 3.0994 and the standard deviation of WE is 2.1201.

i) What is the name of the bias that the coefficient of WE suffers from in the second model? (1 mark)

ii) What is the magnitude of this bias? (5 marks)

d) Consider the following two models:

$$Y = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + u$$

$$Y = \alpha_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + u$$

Based on a random sample of 100 observation, we estimate the two models and obtain the following results:

	Model 1	Model 2
CONSTANT	2692 (16450)	3626 (16560)
X ₂	2754 (1065)	3610 (1789)
X ₃	3691 (1558)	6338 (3294)
X ₄	-9095 (6154)	-8029 (6224)
X ₅		1173 (3217)
X ₆		-2494 (2703)
n	100	100

Standard error in parentheses

- i) Based on the results of the estimation, what econometric problem does the second model suffer from? **Multicollinearity** (1 mark)
- ii) What is the consequence of this problem based on the results? (3 marks)
- e) State any three model selection criteria and indicate how the appropriate model is selected under each criterion. (6 marks)

Question 5 : (20 marks)

* (a) State the two forms of specification error that RESET is designed to detect. (2 marks)

(b) Consider the model: $Y = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + u$.

Based on a random sample of 106 observations, we estimate this model together with an artificial model that includes the squares and cubes of the predicted values of Y . The results are as shown in the table below:

	Model 1	Model 2
CONSTANT	-24060 (25280)	148200 (206500)
X_2	2033 (1916)	-4127 (8540)
X_3	7686 (2386)	-15400 (30730)
X_4	-18860 (11470)	38210 (76500)
\hat{Y}^2		0.00002853 (0.0000469)
\hat{Y}^3		-8.542×10^{-11} (1.739×10^{-10})
RSS	2×10^{11}	1.98×10^{11}
n	106	106

Standard error in parentheses

Based on these results , test for the adequacy of the model.

(6 marks)

* (c) What is collinearity?

(2 marks)

* (d) State any two consequences of collinearity

(2 marks)

* (e) State two ways in which we can identify collinearity

(2 marks)

f) The table below shows data on five workers. Identify the dummy variables in the table
(2 marks)

Wage	Education	Fulltime	Married	Sex
18.70	16	1	1	Female
11.50	12	1	0	Male
15.04	16	1	1	Male
25.95	14	2	0	Female
24.03	12	2	1	Male

g) Consider the linear regression model:

$$WAGE = \beta_1 + \beta_2 EDUC + \beta_3 EXPER + \beta_4 MARRIED + u$$

where WAGE is hourly wage in US Dollars, EDUC is years of education and EXPER is years of experience, MARRIED is a marital status dummy variable that assumes the value 1 for married workers, and u is a random error term.

Based on a random sample of 4838 observations, the model is estimated and the following results obtained:

$$\widehat{WAGE} = 12.75 + 2.05 EDUC + 0.12 \cancel{EXPER} + 2.45 MARRIED.$$

Interpret the estimated values of β_3 and β_4 (4 marks)

TABLE A.3

F Distribution: Critical Values of F (5% significance level)

v_1	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.36	246.46	247.32	248.01
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.42	19.43	19.44	19.45
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69	8.67	8.66
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.87	5.84	5.82	5.80
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.64	4.60	4.58	4.56
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92	3.90	3.87
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49	3.47	3.44
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.24	3.20	3.17	3.15
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99	2.96	2.94
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83	2.80	2.77
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.74	2.70	2.67	2.65
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60	2.57	2.54
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.55	2.51	2.48	2.46
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44	2.41	2.39
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.42	2.38	2.35	2.33
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33	2.30	2.28
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.33	2.29	2.26	2.23
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25	2.22	2.19
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.26	2.21	2.18	2.16
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.22	2.18	2.15	2.12
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.20	2.16	2.12	2.10
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.17	2.13	2.10	2.07
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.15	2.11	2.08	2.05
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.13	2.09	2.05	2.03
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.11	2.07	2.04	2.01
26	4.22	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.09	2.05	2.02	1.99
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.08	2.04	2.00	1.97
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.06	2.02	1.99	1.96
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.05	2.01	1.97	1.94
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.04	1.99	1.96	1.93
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.04	1.99	1.94	1.91	1.88
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.95	1.90	1.87	1.84
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.89	1.85	1.81	1.78
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.86	1.82	1.78	1.75
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.89	1.84	1.79	1.75	1.70
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.82	1.77	1.73	1.69
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.86	1.80	1.76	1.72	1.68
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.79	1.75	1.71	1.66
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.78	1.73	1.69	1.64
150	3.90	3.06	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.82	1.76	1.71	1.67	1.64
200	3.89	3.04	2.65	2.42	2.26	2.14	2.06	1.98	1.93	1.88	1.80	1.74	1.69	1.66	1.62
250	3.88	3.03	2.64	2.41	2.25	2.13	2.05	1.98	1.92	1.87	1.79	1.73	1.68	1.64	1.61
300	3.87	3.03	2.63	2.40	2.24	2.12	2.03	1.96	1.90	1.85	1.78	1.72	1.67	1.63	1.60
400	3.86	3.02	2.63	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.77	1.71	1.66	1.62	1.59
500	3.86	3.01	2.62	2.39	2.23	2.11	2.02	1.95	1.90	1.85	1.77	1.71	1.66	1.62	1.58
600	3.86	3.01	2.62	2.38	2.23	2.11	2.02	1.95	1.89	1.84	1.77	1.70	1.66	1.62	1.58
750	3.85	3.01	2.62	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58
1000	3.85	3.00	2.61	2.38	2.22	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58

TABLE A.2

t Distribution: Critical Values of *t*

Degrees of freedom	Two-tailed test One-tailed test	Significance level					
		10% 5%	5% 2.5%	2% 1%	1% 0.5%	0.2% 0.1%	0.1% 0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850
21		1.721	2.080	2.518	2.831	3.527	3.819
22		1.717	2.074	2.508	2.819	3.505	3.792
23		1.714	2.069	2.500	2.807	3.485	3.768
24		1.711	2.064	2.492	2.797	3.467	3.745
25		1.708	2.060	2.485	2.787	3.450	3.725
26		1.706	2.056	2.479	2.779	3.435	3.707
27		1.703	2.052	2.473	2.771	3.421	3.690
28		1.701	2.048	2.467	2.763	3.408	3.674
29		1.699	2.045	2.462	2.756	3.396	3.659
30		1.697	2.042	2.457	2.750	3.385	3.646
32		1.694	2.037	2.449	2.738	3.365	3.622
34		1.691	2.032	2.441	2.728	3.348	3.601
36		1.688	2.028	2.434	2.719	3.333	3.582
38		1.686	2.024	2.429	2.712	3.319	3.566
40		1.684	2.021	2.423	2.704	3.307	3.551
42		1.682	2.018	2.418	2.698	3.296	3.538
44		1.680	2.015	2.414	2.692	3.286	3.526
46		1.679	2.013	2.410	2.687	3.277	3.515
48		1.677	2.011	2.407	2.682	3.269	3.505
50		1.676	2.009	2.403	2.678	3.261	3.496
60		1.671	2.000	2.390	2.660	3.232	3.460
70		1.667	1.994	2.381	2.648	3.211	3.435
80		1.664	1.990	2.374	2.639	3.195	3.416
90		1.662	1.987	2.368	2.632	3.183	3.402
100		1.660	1.984	2.364	2.626	3.174	3.390
120		1.658	1.980	2.358	2.617	3.160	3.373
150		1.655	1.976	2.351	2.609	3.145	3.357
200		1.653	1.972	2.345	2.601	3.131	3.340
300		1.650	1.968	2.339	2.592	3.118	3.323
400		1.649	1.966	2.336	2.588	3.111	3.315
500		1.648	1.965	2.334	2.586	3.107	3.310
600		1.647	1.964	2.333	2.584	3.104	3.307
∞		1.645	1.960	2.326	2.576	3.090	3.291



UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
ECONOMICS AND STATISTICS.

STA 432: APPLIED ECONOMETRICS

DATE: MAY 30, 2019

TIME: 11.30 A.M. – 1.30 P.M.

INSTRUCTIONS:

The paper contains FIVE Questions.

Answer Question One and any other Two Questions.

Q.1 Consider the demand function for chicken.

$$\ln Y = \beta_0 + \beta_1 \ln X_2 + \beta_2 X_3 + \beta_3 X_4 + \beta_4 X_5 + \mu$$

Where Y = per capita consumption of chicken, X_2 = real disposable per capita income, X_3 = real retail price of chicken per kg, X_4 = real retail price of pork per kg, X_5 = real retail price of beef. \ln = natural logarithm.

- (a) According to economic theory, what would be the expected signs of $\beta_1, \beta_2, \beta_3$ and β_4 ? State reason for your answer. (3 Marks)
- (b) Using time series data for 1960-1982 the following are the OLS estimates.

Variable	Coefficient	Standard error
$\ln X_2$	0.3425	0.0833
$\ln X_3$	-0.5046	0.1109
$\ln X_4$	0.1485	0.0997
$\ln X_5$	0.0911	0.1007
Constant	2.1898	0.1557

- (i) Using the t-test, which of the coefficients are individually statistically significant at either 1%, 5% or 10% level? (5 Marks)
- (ii) Interpret the magnitude of each coefficient. (5 Marks)
- (c) The R^2 of the estimated equation is 0.9823. Interpret it. Given that the model was estimated using time series data, a high R^2 maybe a pointer to an econometric problem. Identify the problem. (2 Marks).
- (d) Using a concrete example explain the steps in an applied econometrics project. (10 Marks)

Q.2 A researcher obtained the following regression results.

$$\begin{array}{l} \text{ln}Y = 2.81 - 0.53 \text{ ln}K + 0.91 \text{ ln}L + 0.047t \\ \text{S.E} \quad (1.38) \quad (0.34) \quad (0.14) \quad (0.021) \\ n=23 \quad R^2=0.97 \text{ Overall F}=189.8 \end{array}$$

Y = real output, K = real capital input, L = real labor input and T = time/trend variable
 \ln = natural logarithm

- (a) Is there multicollinearity in the regression? How do you know? (3 Marks)
- (b) What is the expected sign of $\ln K$ according to economic theory? Do the results conform to this expectation? Why or why not? (5 Marks)
- (c) Identify the production function estimated. (1 Mark)
- (d) Explain why multicollinearity is of concern to a researcher? (5 Marks)
- (e) Using the same data the following regression was obtained

$$\begin{array}{l} \text{Ln}(Y/L) = -0.11 + 0.11 \text{ ln}(K/L) + 0.006T \\ \text{S.E} \quad (0.03) \quad (0.15) \quad (0.006) \\ R^2=0.65 \quad F=19.5 \end{array}$$

Where (Y/L) = output per worker, (K/L) = capital per worker

Interpret the coefficient of $\ln(K/L)$. Is it statistically significant? (3 Marks)

- (f) If there was multicollinearity in the first regression, has that been reduced by the second regression in (e)? How do you know? (3 Marks)

Q.3 The estimated savings function for a country is as follows:

$$\begin{array}{l} Y = 1.0161 + 152.478D + 0.0803X - 0.0655DX \\ \text{S.E} = (20.1648) \quad (33.0824) \quad (0.0144) \quad (0.0159) \\ t = (0.0504) \quad (4.609) \quad (5.541) \quad (-4.096) \end{array}$$

Where Y = savings in billions, X = income in billions, $D = 1$ for observations in 1982-1995 and $D=0$ for observations in 1970-1981, $D.X$ = interaction variable between D and X .

- (a) What is your prior expectation about the relationship between savings and income? Which economic theory is relevant here? (1 Mark)
- (b) ; Holding income constant, what is the average savings in the period 1982-1995. Is it statistically different from the period 1970-1981? How do you know? (5 Marks)
- (c) Are the marginal propensity to save, that is, slopes in the two periods statistically different? How do you know? (5 Marks)
- (d) ; Suppose the researcher estimated a savings model without the variable $D.X$. What is the implication for the magnitude of average savings and marginal propensity to save in 1982-1995? (5 Marks)
- (e) Suppose the dependent variable is $\ln Y$. How would the coefficient on D be interpreted. Show the computations. (4 Marks)

Q.4 Consider the estimated demand for coffee in the U.K.

$$\begin{array}{lll} Y = & 9.1 + 7.8 P_o + 2.4 P_T + 0.0035 M \\ S.E. = & (15.6) \quad (1.2) \quad (0.0010) \\ t = & (0.5) \quad (2.0) \quad (3.5) \\ & R^2 = 0.60 \quad n = 25 \end{array}$$

Where Y =quantity of coffee consumed, P_o = price of Kenya coffee, P_T = price of tea and M = income

- (a) Establish the statistical significance of the price and income coefficients. (3 Marks)
- (b) Interpret the coefficients of P_o , P_T , and M . Are the signs consistent with economic theory? (3 Marks)
- (c) The researcher suspects the model is misspecified. So, she includes the price of Ugandan coffee (P_u) in the equation and obtains.

$$\begin{array}{llll} Y = & 10 + 8 P_u - 5.6 P_o + 2.6 P_T + 0.003M \\ S.E. = & (4.0) \quad (2.0) \quad (1.3) \quad (0.0010) \\ t = & (2.0) \quad (-2.8) \quad (2.0) \quad (3.0) \\ & R^2 = 0.65 \quad n = 25 \end{array}$$

- (i) Is the coefficient on the new variable statistically significant? How do you know? (2 Marks)
- (ii) Interpret the coefficients in the new model. Do the results differ from those in (b)? (4 Marks)
- (iii) Compare the R² in the two models. (2 Marks)
- (iv) Do the magnitudes of the coefficients on P_o, P_f and M change? (3 Marks)
- (d) On the basis of the answers in (c) would you conclude that the initial estimated model was misspecified? What was the nature of the specification error? (3 Marks)

Q.5 A study analyzed the effect of defense expenditures (D) and GNP (Y) on aggregate private consumption (C). The estimated equation is,

$$C = 26.19 + 0.6243Y - 0.4398D$$

S.E = (2.73) (0.0060) (0.0736)
 $R^2 = 0.999 \quad n = 30$

- (a) If heteroskedasticity is a problem does it affect the coefficients or their variances? What is the consequence? *Variance. Not the minimum variance* (5 Marks)
- (b) Explain how in practice the researcher can test for heteroskedasticity using the White test. (5 Marks)
- (c) Suppose in the current example, the researcher assumes that $\sigma^2 = \sigma^2 Y^2$ and transforms the model to obtain the estimates as

$$(C/Y) = 25.92(1/Y) + 0.6246 - 0.4315(D/Y)$$

S.E (2.22) (0.0068) (0.0597)
 $R^2 = 0.875$

- (i) What assumptions does the researcher make about the nature of heteroskedasticity? *L* (1 Mark)
- (ii) Compare the results of the two regressions. Has the transformation of the original model improved the results? (2 Marks)
- (iii) Can you compare the two R² values? Why or why not? (2 Marks)
- (d) What other solutions can be used to handle the problem of heteroskedasticity that is, other than the one implemented in (c)? (5 Marks)

UNIVERSITY OF NAIROBI

SECOND SEMESTER EXAMINATIONS - 2013/2014

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

SFA 432 : APPLIED ECONOMETRICS

DATE: APRIL 25, 2014

TIME: 11.30AM - 1.30PM

INSTRUCTIONS:

- Answer question ONE and any TWO other questions.
- All hypotheses should be tested at the 5% level of significance, unless otherwise specified
- Show all your workings
- Statistical Tables are attached.

Question One (30 marks)

Consider the following model:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + u_i$$

The model is estimated based on a sample of 16 observations and the results of the estimation are shown in the table below:

Variable	Coefficient	Standard Error	P-value
Constant	10816.04	5988.35	0.098
X_2	-2227.704	920.4659	0.034
X_3	1251.141	1157.021	0.303
X_4	6.283	30.6217	0.841
X_5	-197.4	101.5612	0.078
R^2	0.8347		
\bar{R}^2	0.7746		
n	16		

Based on the results in the table

(10 marks)

- (a) Interpret the estimated parameters.

- b) Use the t-test approach to test the hypothesis

$$H_0: \beta_2 = 0$$

$$H_1: \beta_2 \neq 0$$

H_{statistic}

| > |t critical|

reject H₀

(5 marks)

- c) Use the confidence interval approach to test the hypotheses

$$H_0: \beta_1 = 1300$$

$$H_1: \beta_1 \neq 1300$$

Calculate the two CIs. If the β being tested is within the limits then do not reject

(5 marks)

H₀

- d) Use the p-value approach to test the hypothesis

$$H_0: \beta_4 = 0$$

$$H_1: \beta_4 \neq 0$$

→ P-value < α value reject H₀

(3 marks)

- e) Test the hypotheses

$$H_0: \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$$

$$H_1: \beta_2 \neq 0 \text{ or } \beta_3 \neq 0 \text{ or } \beta_4 \neq 0 \text{ or } \beta_5 \neq 0$$

(7 marks)

Question Two (20 marks)

- a) Giving an example in each case, state three ways in which an econometric model differs from an economic model.

(8 marks)

* With the help of an example in each case, distinguish among the following: cross-sectional data, time series data, pooled cross-sectional data, and panel data. (12 marks)

Question Three (20 marks)

- a) The table below shows the results of estimating the model

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + u_t;$$

Variable	Coefficient	Standard Error
Constant	3.9176	2.0122
X_2	0.6648	0.3671
X_3	0.01868	0.2949
R ²	0.8418	
R ²	0.68355	
n	5	

Based on the results in the table, check whether or not the model suffers from multicollinearity. (10 marks)

- b) What are the consequences of using ordinary least squares (OLS) method in the presence of heteroscedasticity? (3 marks)
- c) How can we informally detect the presence of heteroscedasticity in our models? (4 marks)
- d) State any ~~that~~ formal tests of heteroscedasticity. (3 marks)

Question Four (20 marks)

- a) Based on the data set in the table below, the following model is estimated:

$$\hat{Y}_t = 10.763 - 0.75X_t$$

$$V_{\hat{Y}_t} = 1 - \frac{1}{n} \sum_{i=1}^n \frac{(x_i - \bar{x})^2}{(n-1)}$$

- Test for the presence of heteroscedasticity using the Rank correlation test. (16 marks)

i	Y	X	Q.i.	χ^2	χ^2_{crit}	d.f.
1	9	10.20	10.265	0.01	7.81	3
2	8	10.19	10.235	0.02	7.87	3
3	11	7.23	1.462	0.03	7.92	3
4	8	6.24	10.963	0.04	7.97	3
5	10	5.28	1.337	0.05	8.02	3
6	8	7.23	11.138	0.06	8.07	3
7	7	9.37	10.158	0.07	8.12	3
8	13	4.30	6.483	0.08	8.17	3
9	7	3.36	11.063	0.09	8.22	3
10	10	3.35	0.458	0.10	8.27	3

- b) Distinguish between pure autocorrelation and impure autocorrelation. (4 marks)

Question Five (20 marks)

- ~~a)~~ State the assumptions underlying the Durbin-Watson d test. (3 marks)
- ~~b)~~ State two ways in which the Durbin-Watson d test is ^{unusual} when compared to other hypothesis tests in econometrics. (2 marks)
- c) With the help of an example in each case, distinguish between an ANOVA model and an ANCOVA model. (6 marks)
- d) We have information on the score in an examination for a random sample of 100 pupils drawn from different secondary schools in a particular country. We also have information on the pupils' sex, age (in years), type of school attended, and the occupation of the pupils' father. In the sample, we have both male and female pupils. The pupils are drawn from County schools and national schools. The occupations of the father of the pupils in our sample include: farmer, teacher, and trader. We would like to estimate a linear regression model that links a pupil's score in the examination to the pupil's sex, age, type of school attended, and occupation of father. The model must include a constant. Formulate the required model. Remember to define all the variation in the formulated model. (9 marks)

$$\text{Score}_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} (\text{age}) + \beta_4 x_{4i} \left\{ \begin{array}{l} \text{County} \\ \text{Private} \end{array} \right. + \beta_5 x_{5i} \left\{ \begin{array}{l} \text{farmer (1)} \\ \text{teacher (1)} \\ \text{trader (1)} \\ \text{otherwise} \end{array} \right.$$

$i=1, 2, \dots, 100$

x_{1i} male
 x_{2i} female

UNIVERSITY OF NAIROBI
SECOND SEMESTER EXAMINATIONS 2014/2015

**FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
 ECONOMICS AND STATISTICS**

STA 432: APPLIED ECONOMETRICS

DATE: DECEMBER 20, 2014

TIME: 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS:

1. Attempt Question One and any other Two Questions.
2. Show all your workings.
3. All hypotheses should be tested at the 5% level of significance, unless otherwise specified.
4. Statistical Tables are attached.

Question One (30 Marks)

Consider the following model:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + u_i \quad \text{and the estimation results shown in}$$

Table 1.

Table 1: Estimation Results for Question 1(a)

Variable	Dependant Variable=Y				
Constant	182.582	1632.19	-2.530	1911.23	5183.09
X ₂	615.271				
X ₃	387.317	303.339			
X ₄	0.308	0.314	0.299		
X ₅	0.551	0.518	0.530	2.608	
X ₂ +X ₃			594.046		
RSS	644031.4	45211661	1303679	86186620	1.68x10 ⁹
R ²	0.996	0.731	0.992	0.487	0
n	50	50	50	50	50

Based on these results, test the following hypotheses:

$$(i) H_0: \beta_2 = 0$$

$$H_1: \beta_2 \neq 0$$

[6 marks]

(ii) $H_0: \beta_2 = \beta_3$ [6 marks]
 $H_1: \beta_2 \neq \beta_3$

(iii) $H_0: \beta_2 = \beta_3 = \beta_4 = 0$
 $H_1: \beta_2 \neq 0 \text{ or } \beta_3 \neq 0 \text{ or } \beta_4 \neq 0$ [6 marks]

(iv) $H_0: \beta_2 = \beta_3 = \beta_4 = 0$
 $H_1: \beta_2 \neq 0 \text{ or } \beta_3 \neq 0 \text{ or } \beta_4 \neq 0$ [6 marks]

- (b) We have a cross-sectional data set of both males and females. We would like to test whether the same regression model holds for both males and females. Based on the regression results shown in Table 2, test this hypothesis. [6 marks]

Table 2: Estimation Results for Question 1(b)

Variable	Dependent Variable = Wage		
	Both Males and Females	Males only	Females only
Constant	1.573	1.045	1.807
Education	0.015	0.048	-0.0012
RSS	12.95445	3.33641	9.21574
R ²	0.0034	0.0321	0
N	60	12	48

Question Two (20 Marks)

* (a) What is heteroscedasticity? [4 marks]

(b) State any two sources of heteroscedasticity. [4 marks]

* Why is the Ordinary Least Squares method inappropriate in the presence of heteroscedasticity? [4 marks]

* State and briefly explain any two informal methods of testing for heteroscedasticity. *Plotting least squares residuals against explanatory variables and checking who know there's systematic relationship between them.* [4 marks]

* State any four formal methods of testing for heteroscedasticity. [4 marks]

Question One (30 marks)

- a. What is econometrics? (4 marks)
- b. Distinguish between observational data and experimental data. (4 marks)
- c. State and explain three ways in which an econometric model differs from an economic model. (6 marks)
- *d With the help of an example in each case, distinguish among the following types of data: cross-sectional data, time series data, pooled cross sections, panel data. (16 marks)

Question One (20 Marks)

- a. Based on a sample of 8 observations, the following regression model is estimated. Interpret the coefficients of the estimated model. (9 marks)

$$\hat{Y} = 11.113 + 0.103X_2 - 0.666X_3.$$

- *b. State the assumptions underlying the linear regression model. (5 marks)

- c. Test the overall significance of the following estimated model.

$$\hat{Y} = 11.113 + 0.103X_2 - 0.666X_3; \quad n = 8, \quad R^2 = 0.8865, \quad \bar{R}^2 = 0.9411.$$

(6 marks)

Question Three (20 marks)

- *a) Distinguish between perfect multicollinearity and imperfect multicollinearity. (4 marks)

- *b) State any two sources of multicollinearity. (4 marks)

- *c) State any three practical consequences of multicollinearity. (6 marks)

- *d) State any two ways we can detect multicollinearity. (4 marks)

- *e) State any two rules of thumb we can follow when remedying multicollinearity. (2 marks)

Table A.3

F Distribution: Critical Values of F (5% significance level)

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v_1	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
1	151.45	199.50	115.71	204.38	150.16	233.99	236.77	258.36	240.54	241.81	243.91	245.16	246.46	247.32	249.01
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.42	19.43	19.44	19.45
3	10.13	9.55	9.26	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69	8.67	8.66
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.01	5.96	5.91	5.81	5.84	5.87	5.80	5.76
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.61	4.60	4.58	4.56
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92	3.90	3.87
7	5.59	4.74	4.33	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49	3.47	3.45
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.33	3.28	3.24	3.20	3.17	3.15
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99	2.96	2.94
10	4.96	4.10	3.71	3.43	3.23	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83	2.80	2.77
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.74	2.70	2.67	2.65
12	4.75	3.89	3.50	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60	2.57	2.54
13	4.67	3.81	3.43	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.55	2.51	2.48	2.46
14	4.60	3.74	3.36	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44	2.41	2.39
15	4.54	3.68	3.29	3.05	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.42	2.38	2.35	2.33
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33	2.30	2.28
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.33	2.29	2.26	2.23
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25	2.21	2.19
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.26	2.21	2.18	2.15
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.22	2.18	2.15	2.12
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.20	2.16	2.12	2.10
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.17	2.13	2.10	2.08
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.15	2.11	2.09	2.05
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.13	2.09	2.05	2.03
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.11	2.07	2.04	2.01
26	4.22	3.37	2.95	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.09	2.05	2.02	1.99
27	4.21	3.35	2.93	2.71	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.08	2.04	2.00	1.97
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.18	2.10	2.05	2.01	1.97	1.94
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.21	2.16	2.09	2.04	1.99	1.96	1.93
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.04	1.99	1.94	1.91
35	4.12	3.27	2.87	2.64	2.49	2.37	2.29	2.22	2.16	2.11	2.04	1.99	1.94	1.91	1.88
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.95	1.90	1.87	1.84
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03	1.95	1.89	1.85	1.81	1.78
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.86	1.82	1.78	1.75
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97	1.89	1.84	1.79	1.75	1.72
80	3.96	3.11	2.71	2.49	2.33	2.21	2.13	2.06	2.00	1.95	1.88	1.82	1.77	1.73	1.70
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.86	1.80	1.76	1.72	1.69
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93	1.85	1.79	1.75	1.71	1.68
120	3.92	3.07	2.63	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.78	1.73	1.69	1.66
150	3.90	3.06	2.66	2.43	2.27	2.16	2.07	2.00	1.94	1.89	1.82	1.76	1.71	1.67	1.64
200	3.89	3.04	2.65	2.41	2.26	2.14	2.06	1.98	1.93	1.87	1.79	1.73	1.68	1.64	1.61
250	3.88	3.03	2.64	2.41	2.25	2.13	2.05	1.97	1.91	1.86	1.78	1.72	1.68	1.63	1.60
300	3.87	3.03	2.63	2.40	2.24	2.12	2.03	1.96	1.90	1.85	1.78	1.72	1.67	1.63	1.59
400	3.86	3.02	2.63	2.39	2.23	2.12	2.03	1.96	1.90	1.85	1.77	1.71	1.66	1.62	1.59
500	3.86	3.01	2.62	2.39	2.23	2.11	2.02	1.95	1.89	1.84	1.77	1.70	1.66	1.62	1.58
600	3.86	3.01	2.62	2.33	2.13	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58
750	3.85	3.01	2.61	2.18	2.12	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.65	1.61	1.58
1000	3.85	3.00	2.61	2.18	2.12	2.11	2.02	1.95	1.89	1.84	1.76	1.70	1.66	1.62	1.58

- ii. Construct a 95% confidence interval for $\lambda = -0.4\beta_2 + 0.6\beta_3$. (5 marks)
- iii. Test the statistical significance of the coefficient of ADVERT. Use $\alpha = 0.05$. (5 marks)
- iv. Test the hypotheses:

$$H_0: \beta_3 \geq 0.5$$

~~$$H_0: -0.4\beta_2 + 0.6\beta_3 = 0$$~~

~~$$H_1: -0.4\beta_2 + 0.6\beta_3 \neq 0$$~~

~~$$t = \frac{-0.4\beta_2 + 0.6\beta_3}{\text{se}(-0.4\beta_2 + 0.6\beta_3)} \sim t_{72}$$~~

Assuming a 5% significance level,

the critical value is $t_{(0.025, 72)} = 1.993$

~~$$t = \frac{-0.4\beta_2 + 0.6\beta_3}{\text{se}(-0.4\beta_2 + 0.6\beta_3)} = 1.621$$~~

Since $1.621 < 1.993$ Do not reject

H_0 at the 5% level of significance

(continued)

b. Consider the model

$$\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EXPER} + \beta_4 \text{EXPER}^2 + u$$

where WAGE is wage, EDUC is education, and EXPER is experience. You are given data on wages in dollars, education in years of schooling, and experience in years for 1,000 observations.

- ii. Construct a 95% confidence interval for $\lambda = -0.4\beta_2 + 0.6\beta_3$. (5 marks)
- iii. Test the statistical significance of the coefficient of ADVERT. Use $\alpha = 0.05$. (5 marks)
- iv. Test the hypotheses:

$$H_0: \beta_3 \geq 0.5$$

$$H_1: \beta_3 < 0.5.$$

(5 marks)

Question Two (20 Marks)

- * Consider the regression model

$$SALES = \beta_1 + \beta_2 PRICE + \beta_3 ADVERT + u$$

where SALES is sales revenue in thousands of dollars, PRICE is unit price in dollars, and ADVERT is advertising expenditure in thousands of dollars.

Based on data from a sample of 75 observations, we have the following results

$$\widehat{SALES} = 118.914 - 7.908 PRICE + 1.863 ADVERT.$$

$$var(\hat{\beta}) = \begin{bmatrix} 40.3433 & -6.79506 & -0.748421 \\ -6.79506 & 1.2012 & -0.0197422 \\ -0.748421 & -0.0197422 & 0.466756 \end{bmatrix}.$$

Test the hypotheses:

$$H_0: -0.4\beta_2 = -0.6\beta_3$$

$$H_1: -0.4\beta_2 \neq -0.6\beta_3.$$

(5 marks)

- b. Consider the model

$$WAGE = \beta_1 + \beta_2 EDUC + \beta_3 EXPER + \beta_4 EXPER^2 + u$$

where WAGE is wage, EDUC is education, and EXPER is experience. You are given data on wages in dollars, education in years of schooling, and experience in years for 1,000 observations.

- Explain how you would go about testing whether experience influences wage, using the F -test. (5 marks)
- Explain how you would go about testing for the overall significance of the model. (5 marks)
- Explain how you would go about testing the following hypothesis. (5 marks)

$$H_0: \beta_3 + 4\beta_4 = 2$$

$$H_1: \beta_3 + 4\beta_4 \neq 2$$

Question Three (20 marks)

* Consider the model

$$\text{WAGE} = \beta_1 + \beta_2 \text{EDUC} + \beta_3 \text{EXPER} + \beta_4 \text{EXPER}^2 + u$$

where WAGE is wage, EDUC is education, and EXPER is experience. You are given data on wages in dollars, education in years of schooling and experience in years for 1,000 observations. The dataset contains information on 492 females and 508 males.

We estimate the regression model using the female subsample and obtain the following results:

$$RSS = 38554.12, \quad n_1 = 492, \quad k = 4$$

Estimation based on the male sample gives the following results:

$$RSS = 64045.85, \quad n_2 = 508, \quad k = 4$$

Estimation based on the pooled sample gives the following results:

$$RSS_T = 111382.2, \quad n = 1,000, \quad k = 4$$

Based on these results, test whether we may combine the data on males and females in estimating the given model. (5 marks)

$$F = \frac{\frac{RSS_T - RSS_1 - RSS_2}{k}}{\frac{RSS_1 + RSS_2}{n - 2k}} = \frac{\frac{111382.2 - 38554.12 - 64045.85}{4}}{\frac{38554.12 + 64045.85}{1000 - (2 \times 4)}} = \frac{2198.5575}{103.273891} = 21.228$$

critical F value is $F_{0.05, 4, 992} = 2.3809$
 Since $21.228 > 2.3809$ reject H_0 at 5% level of significance and
 conclude that we may not combine the data on males and females in estimating the model. Separate models have to be estimated based on diff. subsamples.

* Consider the regression model

$$SALES = \beta_0 + \beta_1 PRICE + (4.2 - 0.5\beta_1 - 3.158\beta_2 - 1.15\beta_3) ADVERT + \beta_4 ADVERT^2 + u$$

$$SALES = \beta_0 + \beta_1 PRICE + 4\beta_1 ADVERT - 0.5\beta_1 ADVERT^2 - 3.158\beta_2 ADVERT - 1.15\beta_3 ADVERT + \beta_4 ADVERT^3 + u$$

$$SALES - 4\beta_1 ADVERT = \beta_0 (1 - \beta_1 ADVERT) + \beta_1 (PRICE - 3.158ADVERT) + \beta_4 (ADVERT^2 - 1.15ADVERT)^{1/2}$$

$$SALES = \beta_0 + \beta_1 PRICE + \beta_2 ADVERT + \beta_4 ADVERT^2 + u$$

where SALES is sales revenue in thousands of dollars, PRICE is unit price in dollars, and ADVERT is advertising expenditure in thousands of dollars. Suppose we have additional information that

$$\frac{\beta_1}{1.15} + 6\beta_2 + \frac{1.9\beta_3}{1.15} + \frac{3.61\beta_4}{1.15} = 80.$$

Based on data obtained from a sample of 75 observations, explain how you may go about obtaining restricted least squares estimates. (5 marks)

* Consider the models

$$WAGE = \beta_1 + \beta_2 EDUC + u$$

$$WAGE = \beta_1 + \beta_2 EDUC + \beta_3 EXPER + u$$

$$WAGE = \beta_1 + \beta_2 EDUC + \beta_3 EXPER + \beta_4 EXPER^2 + u$$

where WAGE is wage, EDUC is education, and EXPER is experience.

You are given data on wages in dollars, education in years of schooling and experience in years for 1,000 observations. Upon estimation of the models, we can summarize the results in the table below:

Table 1: Goodness of Fit and Information Criteria for WAGES Example

Included Variables	R^2	\hat{R}^2	AIC	SC
EDUC	0.1969	0.1961	7608.659	7618.475
EDUC, EXPER	0.2166	0.2150	7585.829	7600.552
EDUC, EXPER, EXPER ²	0.2390	0.2367	7558.845	7578.476

Based on these data, indicate, with reasons, which of the three is the appropriate model using R^2 , \hat{R}^2 , AIC, and SC. (10 marks)

$$\beta_2 = 1 - 3.8\beta_{14}$$

5

$$S = \beta_0 + \beta_1 P + (1 - 3.8\beta_{14}) AD + \beta_{14} AD^2 + u$$

$$= \beta_0 + \beta_1 P + (AD - 3.8\beta_{14}) AD + \beta_{14} AD^2 + u$$

$$S - AD = \beta_0 + \beta_1 P + \beta_{14} (AD^2 - 3.8\beta_{14}) + u$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + u$$

TABLE A.2
t Distribution: Critical Values of t

Degrees of freedom	One-tailed test	Significance level					
		10%	5%	2%	1%	0.25%	0.1%
1	6.315	12.706	31.831	63.657	318.309	636.619	
2	2.920	4.201	6.965	9.925	19.327	31.599	
3	2.353	3.182	4.541	5.841	10.215	12.924	
4	2.132	2.976	3.747	4.604	7.173	8.610	
5	2.015	2.571	3.365	4.032	5.893	6.869	
6	1.943	2.447	3.143	3.787	5.308	5.959	
7	1.894	2.365	2.998	3.499	4.785	5.408	
8	1.860	2.306	2.896	3.335	4.501	5.041	
9	1.833	2.262	2.821	3.250	4.297	4.781	
10	1.812	2.228	2.764	3.163	4.144	4.587	
11	1.796	2.201	2.718	3.105	4.025	4.437	
12	1.782	2.179	2.681	3.035	3.930	4.318	
13	1.771	2.160	2.650	3.012	3.852	4.221	
14	1.761	2.145	2.624	2.977	3.787	4.140	
15	1.753	2.131	2.602	2.947	3.733	4.073	
16	1.746	2.120	2.583	2.921	3.686	4.015	
17	1.740	2.110	2.567	2.898	3.646	3.965	
18	1.734	2.101	2.552	2.878	3.610	3.922	
19	1.729	2.093	2.539	2.861	3.579	3.883	
20	1.725	2.086	2.528	2.845	3.552	3.850	
21	1.721	2.080	2.518	2.831	3.527	3.819	
22	1.717	2.074	2.508	2.819	3.505	3.792	
23	1.714	2.069	2.500	2.807	3.485	3.768	
24	1.711	2.064	2.492	2.797	3.467	3.745	
25	1.708	2.060	2.485	2.787	3.450	3.725	
26	1.706	2.056	2.479	2.779	3.435	3.707	
27	1.703	2.052	2.473	2.771	3.421	3.690	
28	1.701	2.048	2.467	2.763	3.408	3.674	
29	1.699	2.045	2.462	2.756	3.396	3.659	
30	1.697	2.042	2.457	2.750	3.385	3.646	
32	1.694	2.037	2.449	2.738	3.365	3.622	
34	1.691	2.032	2.441	2.728	3.343	3.601	
36	1.688	2.028	2.434	2.719	3.333	3.582	
38	1.686	2.024	2.429	2.712	3.319	3.566	
40	1.684	2.021	2.423	2.704	3.307	3.551	
42	1.682	2.018	2.418	2.698	3.296	3.538	
44	1.680	2.015	2.414	2.692	3.286	3.526	
46	1.679	2.013	2.410	2.687	3.277	3.515	
48	1.677	2.011	2.407	2.682	3.269	3.505	
50	1.676	2.009	2.403	2.678	3.261	3.490	
60	1.671	2.000	2.390	2.660	3.232	3.460	
70	1.667	1.994	2.381	2.648	3.211	3.435	
80	1.664	1.990	2.374	2.639	3.195	3.416	
90	1.662	1.987	2.368	2.632	3.183	3.402	
100	1.660	1.984	2.364	2.626	3.174	3.390	
120	1.658	1.980	2.358	2.617	3.160	3.373	
150	1.655	1.976	2.351	2.609	3.145	3.357	
200	1.653	1.972	2.345	2.601	3.131	3.340	
300	1.650	1.968	2.339	2.592	3.118	3.323	
400	1.649	1.966	2.336	2.588	3.111	3.315	
500	1.648	1.965	2.334	2.586	3.107	3.310	
600	1.647	1.964	2.333	2.584	3.104	3.307	
	1.645	1.960	2.326	2.576	3.090	3.291	

UNIVERSITY OF NAIROBI
UNIVERSITY EXAMINATIONS 2019/2020

**FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
ECONOMICS AND STATISTICS**

STA 434: SURVEY RESEARCH METHODS

DATE: JANUARY 13, 2020

TIME: 2.00. P.M. – 4.00. P.M.

INSTRUCTIONS: Answer Question ONE and TWO other Questions

Question ONE

[30 marks]

- a) What measurement scale is used to determine each of the following statement/response?

- (i) Classify respondents according to their occupation
- (ii) Rank each brand of toothpaste according to consumers preference
- (iii) What is the last brand of mobile phone you purchased
- (iv) Awareness of three print advertisements.
- (v) Cleaning ability of various detergent

[5 marks]

~~1~~ Reviewing of the literature is the second step in a research process.

[4 marks]

~~2~~ why is review of literature an integral process

~~3~~ Mention two advantages journals have as sources of literature over books.

[4 marks]

~~4~~ ~~5~~ Mention two advantages journals have as sources of literature over books.

[2 marks]

~~1~~ (i) The Likert scales usually consist of two parts. Identify and differentiate the two parts.

[4 marks]

~~2~~ (ii) State one merit and one demerit of each of the following rating measures: - category scale and staple scale.

[4 marks]

~~3~~ d) Show with the help of an example how you can convert ordinal scale measurement to nominal scale measurement.

[4 marks]

~~4~~ e) (i) Give an example to show that a scale could be reliable yet it may lack validity.

[2 marks]

~~5~~ (ii) List out the limitations of test-retest reliability.

[4 marks]

~~6~~ (iii) Outline precautions undertaken by a researcher to ensure the scale developed by him/her does not lack in content validity.

[4 marks]

Question 2 [15 marks]

- a) Psychologists are interested in helping people overcome their fears, anxieties and phobias. One way about finding out about this is to ask people to fill a questionnaire. In this way they can write about their fears, anxieties and phobias and how they can overcome them without having to talk about them.
- Outline one advantage and one disadvantage of using a questionnaire in this study. [2 marks]
 - Give a strength and a weakness of using an interview instead of a questionnaire in this study. [2 marks]
 - What is meant by a semi-structured interview [2 marks]
 - Outline strength of semi-structured interview over a structured interview. [2 marks]
 - Why has an unstructured interview not been chosen to carry out this study? [2 marks]
- b) (i) What is meant by the term measurement? [1 mark]
(ii) Nominal scale is one of the four scales of measurement used to measure attitude. Outline its merits and demerits and permissible statistics. [4 marks]

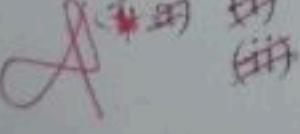
Question 3 [15 marks]

- a) Take any four brands of toothpaste and administer a paired comparison rating scale on a set of 100 respondents. Show how would you obtain an interval scale for the positions of different brands from the original data. [8 marks]
- b) (i) Outline the steps in the construction of a Thurstone equal appearing interval scale. [5 marks]
(ii) Give one merit and one demerit of a Thurstone scale. [2 marks]

Question 4 [15 marks]

- a) (i) Outline the procedure for construction of a Likert scale. [4 marks]
(ii) Give one advantage and one disadvantage of a Likert scale [2 marks]
- b) The method of analysis of data depends upon the level of its measurement. Discuss. [6 marks]
- c) List out one salient feature of the following: Bulb, Kettle, TV [3 marks]

Question 5 [15 marks]

- A  a) What is meant by the term object. [1 mark]
Identify and differentiate the two properties of any object of your choice. [4 marks]
- b) (i) What is scaling. [1 mark]
(ii) Mention four characteristics of scales. [4 marks]

* ~~(a)~~ Mention any two limitations of the following methods of primary data collection

- (i) Observation method
- (ii) Survey method
- (iii) Contact methods

[6 marks]

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UNIVERSITY EXAMINATIONS 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 434: SURVEY RESEARCH METHODS

DATE: JUNE 3, 2019

TIME: 11.30 A.M. – 1.30 P.M.

INSTRUCTIONS

Answer Question ONE and TWO other Questions.

QUESTION ONE (30 MARKS)

Define the following terms as used in survey research.

- | | | |
|-------|--------------|-----------|
| (i) | Research | (1 Marks) |
| (ii) | Philosophy | (1 Marks) |
| (iii) | Validity | (1 Marks) |
| (iv) | Population | (1 Marks) |
| (v) | Sample Frame | (2 Marks) |

With examples differentiate the following concepts as used in research:

- | | | |
|-------|--------------------------------------|-----------|
| (i) | Variables and concepts. | (4 Marks) |
| (ii) | Questionnaire and a survey ✓ | (4 Marks) |
| (iii) | Research methods and research design | (4 Marks) |
| (iv) | Reliability and validity | (4 Marks) |

There are four types of scales used in marketing research to measure attitude towards a particular product/service. Discuss any two scales clearly indicating their limitations and permissible statistics. (8 Marks)

QUESTION TWO (20 MARKS)

* (a) Clearly outline the process of constructing a research instrument. (7 Marks)

* (b) Discuss the advantages and disadvantages of using questionnaire as a data collection method in research. (6 Marks)

(c) Clearly explain the steps involved in using Content Analysis as a data analysis method in research. (7 Marks)

QUESTION THREE (20 MARKS)

* (a) State and explain the considerations made in selecting a research problem.

(12 Marks)

(b) State and explain four methods of prediction used in assessing the impact of a survey study in research.

(8 Marks)

QUESTION FOUR (20 MARKS)

* (a) Discuss the following considerations during data collection process:

* (i) Ethical issues concerning research participants.

(6 Marks)

* (ii) Ethical issues concerning researchers.

(5 Marks)

(b) State and explain the advantages and disadvantages of the three contact methods used in primary data collection. (9 Marks)

QUESTION FIVE (20 MARKS)

(a) Experimental research is considered the most powerful support for any given hypothesis. Discuss. (6 Marks)

* (b) Explain the four classifications of research according to objectives. (8 Marks)

* (c) Outline merits and demerits of each of the following sampling methods:

* (i) Systematic sampling

(8 Marks)

* (ii) Quota sampling

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FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 434: SURVEY RESEARCH METHODS

DATE: JUNE 3, 2019

TIME: 11.30 A.M. - 1.30 P.M.

INSTRUCTIONS

Answer Question ONE and TWO other Questions.

QUESTION ONE (30 MARKS)

(a) Define the following terms as used in survey research.

- (i) Research (1 Marks)
- (ii) Philosophy (1 Marks)
- (iii) Validity (1 Marks)
- (iv) Population (1 Marks)
- (v) Sample Frame (2 Marks)

(b) With examples differentiate the following concepts as used in research:

- (i) Variables and concepts. (4 Marks)
- (ii) Questionnaire and a survey ✓ (4 Marks)
- (iii) Research methods and research design (4 Marks)
- (iv) Reliability and validity (4 Marks)

(c) There are four types of scales used in marketing research to measure attitude towards a particular product/service. Discuss any two scales clearly indicating their limitations and permissible statistics. (8 Marks)

QUESTION TWO (20 MARKS)

- (a) Clearly outline the process of constructing a research instrument. (7 Marks)
- (b) Discuss the advantages and disadvantages of using questionnaire as a data collection method in research. (6 Marks)
- (c) Clearly explain the steps involved in using Content Analysis as a data analysis method in research. (7 Marks)

QUESTION THREE (20 MARKS)

- ✓ (a) State and explain the considerations made in selecting a research problem.
- Magnitude / extent
- interest
- level of difficulty
- ✓ (b) State and explain four methods of prediction used in assessing the impact of a survey study in research.
- Best estimate
- Delphi technique
- Quantitative methods
- Case studies
- experiments & physical models

QUESTION FOUR (20 MARKS)

Discuss the following considerations during data collection process:

- (a) Discuss the following considerations during data collection process:
(i) Ethical issues concerning research participants. (6 Marks)
(ii) Ethical issues concerning researchers. (5 Marks)
- ✓ (b) State and explain the advantages and disadvantages of the three contact methods used in primary data collection. (9 Marks)

QUESTION FIVE (20 MARKS)

- (a) Experimental research is considered the most powerful support for any given hypothesis. Discuss. (6 Marks)
- (b) Explain the four classifications of research according to objectives. (8 Marks)
- (c) Outline merits and demerits of each of the following sampling methods:
(i) Systematic sampling
(ii) Quota sampling (8 Marks)

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FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 434: SURVEY RESEARCH METHODS

DATE: JUNE 3, 2019

TIME: 11.30 A.M. - 1.30 P.M.

INSTRUCTIONS

Answer Question ONE and TWO other Questions.

QUESTION ONE (30 MARKS)

(a) Define the following terms as used in survey research.

- | | | |
|-------|-------------------|-----------|
| (i) | Research | (1 Marks) |
| (ii) | Philosophy | (1 Marks) |
| (iii) | Validity | (1 Marks) |
| (iv) | <u>Population</u> | (1 Marks) |
| (v) | Sample Frame | (2 Marks) |

(b) With examples differentiate the following concepts as used in research:

- | | | |
|-------|---|-----------|
| (i) | <u>Variables and concepts</u> | (4 Marks) |
| (ii) | Questionnaire and a survey ✓ | (4 Marks) |
| (iii) | <u>Research methods and research design</u> | (4 Marks) |
| (iv) | <u>Reliability and validity</u> ↗ | (4 Marks) |

(c) There are four types of scales used in marketing research to measure attitude towards a particular product/service. Discuss any two scales clearly indicating their limitations and permissible statistics. (8 Marks)

QUESTION TWO (20 MARKS)

- (a) Clearly outline the process of constructing a research instrument. (7 Marks)
- (b) Discuss the advantages and disadvantages of using questionnaire as a data collection method in research. (6 Marks)
- (c) Clearly explain the steps involved in using Content Analysis as a data analysis method in research. (7 Marks)

QUESTION THREE (20 MARKS)

- ✓ (a) State and explain the considerations made in selecting a research problem.
- Marginalized / - ethical - Religious
- interest - level of finance.
- (b) State and explain four methods of prediction used in assessing the impact of a survey study in research.
- Best estimate from previous judgment
- Qualitative mathematical models - probabilistic values
- case studies
- experiments & physical models.

QUESTION FOUR (20 MARKS)

- (a) Discuss the following considerations during data collection process:
(i) Ethical issues concerning research participants. (6 Marks)
(ii) Ethical issues concerning researchers. (5 Marks)
- (b) State and explain the advantages and disadvantages of the three contact methods used in primary data collection.
- Mail
- telephone
- personal interview

QUESTION FIVE (20 MARKS)

- (a) Experimental research is considered the most powerful support for any given hypothesis. Discuss. (6 Marks)
- (b) Explain the four classifications of research according to objectives. (8 Marks)
- (c) Outline merits and demerits of each of the following sampling methods:
(i) Systematic sampling
(ii) Quota sampling (8 Marks)

UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF

ECONOMICS AND STATISTICS

STA 434: SURVEY RESEARCH METHODS

DATE: JUNE 3, 2019

TIME: 11.30 A.M. – 1.30 P.M.

INSTRUCTIONS

Answer Question ONE and TWO other Questions.

QUESTION ONE (30 MARKS)

- (a) Define the following terms as used in survey research.
- (i) Research (1 Marks)
 - (ii) Philosophy (1 Marks)
 - (iii) Validity (1 Marks)
 - (iv) Population (1 Marks)
 - (v) Sample Frame (2 Marks)
- (b) With examples differentiate the following concepts as used in research:
- (i) Variables and concepts. (4 Marks)
 - (ii) Questionnaire and a survey ✓ (4 Marks)
 - (iii) Research methods and research design (4 Marks)
 - (iv) Reliability and validity (4 Marks)
- (c) There are four types of scales used in marketing research to measure attitude towards a particular product service. Discuss any two scales clearly indicating their limitations and permissible statistics. (8 Marks)

QUESTION TWO (20 MARKS)

- (a) Clearly outline the process of constructing a research instrument. (7 Marks)
- (b) Discuss the advantages and disadvantages of using questionnaire as a data collection method in research. (6 Marks)
- (c) Clearly explain the steps involved in using Content Analysis as a data analysis method in research. (7 Marks)

QUESTION THREE (20 MARKS)

- (a) State and explain the considerations made in selecting a research problem.
- Magnitude / - ethical
- interest - level of finance
- importance & worth
- (b) State and explain four methods of prediction used in assessing the impact of a survey study in research.
- Best estimate professional judgment
- Qualitative mathematical models - Quantitative approach
- Case studies
- Experiments & physical models

QUESTION FOUR (20 MARKS)

- (a) Discuss the following considerations during data collection process:
- (i) Ethical issues concerning research participants. (6 Marks)
(ii) Ethical issues concerning researchers. (5 Marks)
- (b) State and explain the advantages and disadvantages of the three contact methods used in primary data collection.
- mail - telephone - individual interview
- inexpensive - expensive
- independent - dependent
- inappropriate - appropriate

QUESTION FIVE (20 MARKS)

- (a) Experimental research is considered the most powerful support for any given hypothesis. Discuss. (6 Marks)
- (b) Explain the four classifications of research according to objectives. (8 Marks)
- (c) Outline merits and demerits of each of the following sampling methods:
(i) Systematic sampling
(ii) Quota sampling (8 Marks)

STA 434 SURVEY RESEARCH METHODS

CONTINUOUS ASSESSMENT TEST

10th May 2019

Answer ALL Questions (25 marks)

- 1) Classify research according to the three key perspectives (5 marks)
- 2) Explain the core functions of literature review. (5 marks)
- 3) Define scale and discuss the four types of scales used in research. (5 marks)
- 4) Experimental research is considered the most powerful support for any given hypothesis. Discuss. (5 marks)
- 5) Define and explain three non-probability samples used in research. (5 marks)

UNIVERSITY OF NAIROBI

MODULE I AND II DEGREE PROGRAMME - 2014/2015

FOURTH YEAR EXAMINATIONS FOR THE DEGREES OF BACHELOR OF ECONOMICS AND BACHELOR OF ECONOMICS AND STATISTICS

STA 434 : SURVEY RESEARCH METHODS

DATE: APRIL 15, 2015

TIME: 3.00 P.M. - 5.00P.M.

INSTRUCTIONS:

Answer question ONE and TWO other questions.

Question One (30 marks)

a) Define the following terms;

- i) Attributes - yes
- ii) Belief
- iii) Attitude - anticipation or state of mind

(6 marks)

b) List out the salient attributes of the following products

- i) Mobile handset
- ii) Handbag
- iii) Body lotion
- iii) Camera

(8 marks)

c) List out the three important issues in attitude measurement. - preference, consistency of goals, accuracy of self-perception, personal attitude (3 marks)

d) Distinguish between convenience and purposive sampling. (3 marks)

e) For the process to qualify as research it must have certain characteristics some of which

are: systematic, valid and verifiable, and empirical. Explain each of them. (6 marks)

f) Literature review is integral part of entire research process and makes valuable contribution to every operational step. Outline the functions of literature review. (4 marks)

- Methodology
- objectives

Question Two (20 marks)

- a) What are the different levels of measurement? Discuss the mathematical operations which may not be used under each level of measurement. (14 marks)
- b) What is validity? The two types of validity are : context validity and construct validity. Explain what is meant by each of them. (6 marks)

Question Three (20 marks)

- a) i) Outline the procedure for constructing a Likert Scale.
ii) What are some of its limitations and merits of a Likert Scale. (10 marks)
- b) i) Outline the procedure for construction of a Thurstone Scale.
ii) Mention some limitations and merits of a Thurstone Scale. (10 marks)

Question Four (20 marks)

- i) Give any three differences between Likert Scale and Thurstone Scale. (6 marks)
- ii) Formulating the research problem is one of the steps in Research process. Outline and discuss any four considerations in selecting a research problem. (3 marks)

Survey method is most suited for gathering descriptive information. outline advantages and limitations of this approach. (6 marks)

Question Five (20 marks)

- * A sample is a segment or portion or part of subset of the population selected to represent the population as a whole. Designing the sample calls for three decisions. Identify and elaborate on each. (6 marks)

* Discuss the three types of questionnaires. (8 marks)

* Discuss ethical issues concerning research participants. (8 marks)

- Consent
- Informed consent
- Protection - harm theory
- Confidentiality of info - protect
-

UNIVERSITY OF NAIROBI
MODULE II DEGREE PROGRAMME 2013/2014

THIRD YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
ARTS

STA434: SURVEY RESEARCH METHODS

DATE: DECEMBER 14, 2013

TIME: 9.00 A.M. - 11.00 A.M.

INSTRUCTIONS: Answer Question ONE and TWO other Questions

Question ONE

[30 marks]

a) Case Study

[20 marks]

Ice-cream giant of U.S. Blue Bells wants to set up various soft cones vending machines at various shopping malls and other shopping places. The use of the ice cream is that it is less sweet, low calories and yet very thick and creamy. They have 5 flavours i.e. vanilla, dark cocoa, coffee, butter scotch and strawberry. They also have unique real fruit flavours in orange, kiwi, black currant and mixed fruit. Before they launch the ice cream they need to know the taste preferences, buyer's behaviour towards their spending power and frequency of eating ice cream. The ice cream is targeted to health conscious consumers.

- (i) What is research process? Explain the research process for the above case.
- (ii) As a researcher which research design would you use? Justify your choice.
- (iii) Which scaling technique you would recommend for the measurement of the data collected.
- (iv) Which technique you would use to test the "value for money" satisfaction?

b) Write short notes on

- i) Multi stage sampling
- ii) Sampling error
- iii) Semantic differential scale
- iv) Non-structured, disguised questioning
- v) Thurstone scale

[10 marks]

~~the UNIVERSITY OF NAIROBI~~

~~It is MODULE II PROGRAMME - 2011/2012~~ examination in which
~~ORG. operate.~~

~~FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
ECONOMICS AND STATISTICS~~

~~OF OPPORTUNITY SURVEY RESEARCH METHODS~~

~~STA 434: SURVEY RESEARCH METHODS~~

~~DATE: APRIL 14, 2012~~ ~~Org. Objectives~~ ~~Successful achievement~~

~~TIME: 9.00AM - 11.00AM~~

~~INSTRUCTIONS: Instructions are~~

1. Answer ~~any THREE~~ questions
2. Show all workings
3. Statistical tables are attached

~~factors associate with government & its agencies including legislation, policies, international relations~~

~~Presidential decree (order), environmental regulation~~

~~and political stability~~

~~Describe various types of research writings. Which one is considered most suitable for economic research?~~

~~i) Economic factors~~

~~Distinguish among response error, interviewer error and non-response error.~~

~~The are six factors that affect Purchasing Process~~

~~of customers & organization's Cost of Capital.~~

~~They include factors like Inflation, interest rates,~~

~~QUESTION TWO~~

~~Exchange rates, levels of employment & taxes~~

~~Explain the various questions that are considered essential for planning academic writings~~

~~ii) Social factors~~

~~Describe the purpose of research writing and how it is accomplished.~~

~~Use Demographic & Cultural factors.~~

~~Explain various research approaches and provide specific examples.~~

~~Individual in a society~~

~~& their attitude towards org. products. Their includ-~~

~~QUESTION THREE~~

~~Age profile, gender issues, religion, fections... like~~

~~etc. Explain the various steps involved in it. Influence~~

~~Describe research methodology and explain the various steps involved in it.~~

~~Support the answers by examples.~~

~~iii) Explain basic principles of social science research~~

~~Support the answers by examples.~~

~~Technological factors~~

~~These are factors affecting the processes of production~~

~~including outsourcing decisions including~~

~~Cost of production~~

- c) i) Describe the aspects of scientific attitude that are useful in research.
ii) Compare primary and secondary data.

QUESTION FOUR

- a) Describe paradigm and explain how research and scientific activity varies in its use of paradigm?
- b) Explain the importance of validity and reliability in social science research.
- c) Describe characteristics of research in economics, support the answer with examples.

QUESTION FIVE

- a) Describe various aspects related to the research questions and how these can be linked with research hypotheses?
- b) Explain the role of research design in planning and conducting social science research.
- c) Describe various data collection methods and compare these by highlighting their merits and demerits.

... END ...

UNIVERSITY OF NAIROBI

MODULAR EXAMINATIONS - 2010/2011

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND STATISTICS

STA 434: SURVEY RESEARCH METHODS

DATE: DECEMBER 10, 2011

TIME: 9.00 A.M. - 11.00 A.M.

INSTRUCTIONS:

Answer question ONE and any other THREE questions.

Question ONE [30 marks]

- (a) (i) Describe what is meant by measurements as applied to survey research. [2 marks]
✓ (ii) Describe any three types of scales used in measurements. [6 marks]
(iii) Briefly explain any three validity tests used in measurements. [6 marks]
(iv) Describe any three sources of errors in a survey research. [6 marks]
(c) Discuss the benefits of conducting an experimental study. [5 marks]
(d) Discuss the pro's and con's of qualitative vs quantitative research. Give example of situations where each would be applicable. [5 marks]

Question TWO [20 marks]

- (e) Distinguish between primary data and secondary data. Give examples of when you would use each source for data collection. [8 marks]
(f) Identify the different statistical techniques that can be used in descriptive statistics. [6 marks]

- (c) One of the most common descriptive statistic is the mean. Give any three types of means and briefly describe the characteristics of each [6 marks]

Question THREE [20 marks]

- (a) The data in the following contingency table are from a survey of married adults living with one or more children, as reported by Kalmuss and Seltzer (1986)

		Present Family Type		
		Intact	Remarried	Reconstituted
Spousal Abuse	No Abuse	743	92	78
	Abuse	36	9	11

Spouses in 'intact' families have never been divorced; one or both spouses in 'remarried' families have been divorced, but the children in the household are one from the present marriage; at least one child in a 'reconstituted' family comes from a previous marriage. The respondents reported whether they experienced abuse in the previous year (as either victim or aggressor).

- (i) What is the explanatory variable in this table? [4 marks]
 (ii) What is the response variable? [4 marks]
 For each of the variables identified in (i) and (ii) give a reason
 b) Suppose an economist suspects that risk factors for economic decline differ from region to region and decides to use existing data to make appropriate recommendations. With reasons;
 (i) What will be the hypotheses?
 (ii) What components/variables must the data contain?
 (iii) What test statistic should be used? [12 marks]

Question FOUR [20 marks]

- (a) Explain why low response rate is a concern in survey research [6 marks]
 (b) Discuss on how random errors can be minimized in a research [6 marks]
 (c) Discuss the importance of the following measures of dispersion.
 (i) Standard deviation [4 marks]
 (ii) Range

(d) State four factors that influence the choice of a study design.

[4 marks]

Question FIVE [20 marks]

(a) Give reasons why survey is important in research.

[4 marks]

(b) Give FOUR advantages of personal interview as a method of data collection

[4 marks]

(c) Modern ways of data collection have emerged with the advancement in technology.
Give FOUR advantages of web surveys as a method of data collection. [4 marks]

(d) A multi-national company wants to investigate on the popularity of one of their products. Propose two research designs that will be appropriate for their research. Give reasons as to why the designs will be most suited. [8 marks]

Research Design

UNIVERSITY OF NAIROBI

MODULE II DEGREE PROGRAMME 2010/2011

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS

STA 434: SURVEY RESEARCH METHODS

DATE: 15 JANUARY 2011

TIME: 9.00 A.M. - 11.00 A.M.

Instructions: Answer Question ONE and any other TWO

Question ONE (30 Marks)-Compulsory

- a). A health researcher believes that in a certain region anaemia, malaria and malnutrition are serious problems among adult males and, in particular, among farmers. He therefore wishes to study the prevalence of these diseases among adult males of various ages, family size, occupations and educational backgrounds in order to determine how serious a problem these diseases are for this population.

Required:

- i. What are the dependent and independent variables in the study? (5 marks)
 - ii. Which of these are categorical (ordinal and nominal) and which are numerical (continuous and discrete) variables? (5 marks)
- b). A large organization located in Nairobi, wishes to conduct market survey on the popularity of their product. Before they commence their research they will desire to get advice from an expert on market survey. If you are approached to give that kind of expertise what method of:
 - i. Data collection,
 - ii. Measuring scale :(10 marks)

Will you advise them to use. Give reasons for your answer.

- c). Describe any two types of research design that will be appropriate in understanding the perception of the populace towards a given product in the market. (8 marks)
- d). Distinguish between qualitative research and quantitative research. (2 marks)

Question TWO (20 Marks)

- a). A district medical officer (DMO) receives a complaint from the community that village health workers (VHWs) often run out of chloroquine. In preliminary investigations this shortage of chloroquine is confirmed. VHWs get their drugs at monthly meetings at the health centre. The DMO decides to investigate why the supply of drugs to VHWs is unsatisfactory.

Required

- i. What is the dependent variable in the study (2 marks)
 - ii. What would be a meaningful indicator for the dependent variable? (2 marks)
 - iii. How would you define 'short of chloroquine'? (2 marks)
 - iv. Can you think of some independent variables? (2 marks)
 - v. Which independent variables are 'measurable' as they are and which ones need indicators? (2 marks)
(Is adverb)
- b). State and explain any three factors likely to influence responses in an interview. (6 marks)
- c). List any four methods for handling field errors in a survey research. (4 marks)

Question THREE (20 marks)

- a). State any two factors to consider in choosing the type of study design *(already)* (2 marks)
- b). Discuss any five strategies one can use to deal with threats to validity. (10 Marks)
- c). Discuss the possible sources of bias during data collection. (3 marks)

Question FOUR (20 marks)

- a). Describe any three types of non-response that is likely to occur in survey research. (6 marks)
- b). Discuss the procedures for dealing with non-response in survey research. (6 marks)
- c). Discuss the causes of non-response in survey research. (6 marks)
- d). What are the effects of non-response in survey research? (2 marks)

Question FIVE (20 Marks)

- a). One of the most widely used statistic in survey research is the mean. Give FOUR types of means and describe the characteristics of each. (4 marks)
- b). The following data values were obtained from a sample survey on the average expenditure for lunch attributable to six workers in industrial area: 34, 27, 45, 55, 22, 34. Calculate:
 - i. Arithmetic mean (6 marks)
 - ii. Geometric mean (2 marks)
 - iii. Harmonic mean (4 marks)
- c). Describe what is meant by measurement as applied to survey research. (4 marks)
- d). Distinguish between reliability and validity of measurement. (4 marks)
- e). What are the traits of the ideal interviewer? (4 marks)

UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS – 2019/2020

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS AND BACHELOR OF ECONOMICS AND STATISTICS

XEA 406: POVERTY AND DEVELOPMENT

DATE: JANUARY 10, 2020

TIME: 2.00 P.M. – 4.00 P.M.

INSTRUCTIONS:

Answer THREE Questions. Question ONE is compulsory.

1.
 - * a) Discuss the 4 main determinants of poverty. (8 marks)
 - * b) What is a poverty profile? (4 marks)
 - * c) Discuss the 8 qualities of a good measure of income inequality. (2 marks)
 - * d) Discuss the 3 axioms that are essential to any good measure of poverty. (6 marks)
2. In poverty monitoring, one has to select the key targets that measure the progress towards goals. Discuss the qualities of a good indicator. (20 marks)
3. Discuss the policies that can lead to empowerment of the poor in order for them to escape poverty. (20 marks)
4. Discuss the measures that can be put into place to ensure income security of the poor. (20 marks)
5.
 - * a) Discuss the four steps used in building up a poverty line using the cost of basic needs approach. (4 marks)
 - * b) Discuss 4 reasons why income tends to be understated. (8 marks)
 - * c) Discuss 4 reasons why consumption is a better indicator for a poverty measurement than income. (8 marks)

UNIVERSITY OF NAIROBI
MODULE II DEGREE PROGRAMME 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF ECONOMICS

XEA 406 - POVERTY AND DEVELOPMENT

DATE: MAY 31, 2019

TIME: 11.30 A.M. - 1.30 P.M.

INSTRUCTIONS:

Answer Question ONE and any other TWO Questions.

QUESTION ONE (COMPULSORY - 30 MARKS)

(a) The following information is given about country X and Y.

Indicators	X	Y
Life expectancy at birth	65.6 years	77 years
Adult Literacy Ratio	83.6%	71.3%
Gross enrollment in Education	69.6%	55.2%
GDP Per Capita (PPP \$)	2,622	3,500

- (i) Determine the Life Expectancy Index, Education Index and Income Index for country X.
- (ii) Determine the Life Expectancy Index, Education Index and Income Index for country Y.
- (iii) Calculate the HDI for each country and interpret your results.
- (iv) Discuss the performance of each country and provide policy prescriptions that reduce poverty and enhance development.
- (b) Burgess and Besley (2008) in their article, "Having Global Poverty" discusses the agenda for reducing poverty in developing countries. Explain the Five policy areas available for sub-national studies and the emerging consensus on poverty.

QUESTION TWO (20 MARKS)

- (a) Explain the three objectives of development according to Michael Todaro. [10 marks]
- (b) Andy McKay (2012) in the paper, "Growth and Poverty Reduction in Africa in the AERC growth-poverty project and beyond" tables the growth prospect of sub-Saharan Africa. What are the lessons on changes in poverty from AERC Growth-poverty Nexus project? [10 marks]

QUESTION THREE (20 MARKS)

- (a) Handley, Higgins and Sharma (2009) in their journal article, "Poverty and Poverty reduction in sub-Saharan Africa: An overview of issues" discusses poverty focused policies for development and poverty reduction. Explain five of these policies.
- (b) Explain the significance of Lorenz curve in measuring inequality. What are the problems of Lorenz curve?

QUESTION FOUR (20 MARKS)

- (a) Explain the four criteria of measuring inequality in developing countries. How are they relevant in poverty reduction in Africa?
- (b) Duflo and Banerjee (2007) article on the Economic lives of the poor gives an account of the nature of poverty in developing countries. What is the main thrust of the article?

QUESTION FIVE (20 MARKS)

Write brief notes on the following topics as used in poverty and development:

- (a) Macroeconomic policies and poverty
- (b) Poverty reduction policies
- (c) Poverty and social conflict
- (d) Poverty and Health

UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2017/2018

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS

XEA 406: POVERTY AND DEVELOPMENT

DATE: OCTOBER 26, 2018

TIME: 9.00 A.M - 12.00 NOON

INSTRUCTIONS

Answer ANY THREE questions

All questions carry EQUAL marks.

Question One

- (i) Discuss the core values of development Economics.
- (ii) Discuss the economic, social, political and environmental sources of poverty.
- (iii) Discuss the micro and macro levels effects of poverty
- (iv) ~~Discuss the measures of poverty (methods)~~
- (v) What are the potential remedies of poverty?

Question Two

- (i) What is inequality and why care about it?
- (ii) Discuss the causes of inequality measurement
- (iii) Describe the four criteria for inequality measurement
- (iv) Discuss the relationship between growth and inequality
- (v) Discuss the potential remedies of inequality.
- (vi) Discuss the four recent arguments on achieving development.

Question Three

- *(i) What is Lorenz Curve?
- *(ii) What is GINI coefficient?
- (iii) Discuss the shortcomings of the Lorenz curve
- (iv) Discuss the Sustainable Development Goals-(SDGs)
- (v) What are the advantages and disadvantages of Human Development Index (HDI)
- *(vi) Discuss the poverty reduction strategies.

Question Four

- (i) Discuss the growth theories and how they are relevant to Kenya
- (ii) Describe the implications for population growth in Kenya
- (iii) Discuss the reasons for high fertility in Kenya.
- (iv) What are the cost and benefits of population growth?
- (v) Discuss the effect of HIV and AIDS in Development in Kenya

Question Five

Discuss the policy implication of poverty on the following:

- (i) Social conflict
- (ii) Health
- (iii) Environment
- (iv) Macroeconomic policies
- (v) Social capital.

UNIVERSITY OF NAIROBI

MODULE II DEGREE PROGRAMME 2015/2016

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS

XEA 406: POVERTY AND DEVELOPMENT

DATE: JUNE 8, 2017

TIME: 3.00 P.M. - 5.00 P.M.

INSTRUCTIONS

Answer Question ONE and any other TWO Questions.

Q 1. (30 Marks)

- (a) Consider the following information about country X and Y.

Indicators	X	Y	
Life expectancy at birth	55.6 years	67 years	40.1%
Adult Literacy Ratio (ALR)	73.6%	61.3%	0.14%
Combined Gross enrolment in Education	59.6%	45.2%	14.3%
GDP per Capita (PPP \$)	1,622	2,500	1.6%

- (i) Find the Life Expectancy Index, Education and Income Index for each country.
- (ii) Calculate the Human Development Index (HDI) for each country and interpret your results.
- (iii) Discuss the performance of each country relative to the other, and provide policy prescriptions that reduce poverty and promote development.

(b) The following information is given on the cumulative population and income:

Cumulative population (%)	0	20	40	60	80	100
Cumulative Income (%)	0	4	10	23	50	100

- (i) Construct a Lorenz Curve and enumerate its significance in measuring inequality.

- (ii) What are the problems with Lorenz Curve?

- (c) Hardley, Higgins and Sharma (2009) in their article "Poverty and Poverty Reduction in Sub-Saharan Africa: An Overview of Key Issues", enumerates FOUR socio-economic drivers and maintenance of poverty in Africa. Briefly explain them and how they drive poverty in Africa.

Q 2. *

- Explain the FOUR criteria for measuring inequality. How are they relevant in reducing poverty in Africa? (8 Marks)

(b)

- Paul Collier (2007), "Poverty Reduction in Africa" argues that poverty has been rising for the last quarter of a century in SSA, but falling in the rest of the developed world. Explain the main reasons for this according to the author. (12 Marks)

- Q 3. (a) Explain the three objectives of development according to Todaro. (6 Marks)

(b)

- Dullo and Banerjee (2007), "The Economic Links of the Poor" gives an account of the nature of poverty in developing countries. What is the main thrust of the article? (14 Marks)

- Q 4. (a) Discuss the key measures of poverty in developing countries. How are they relevant on poverty reduction? (8 Marks)

(b)

- Burgess and Besley (2008), "Halving Global Poverty" examines the agenda for reducing poverty in developing countries. Explain the FIVE policy areas available for sub-National studies and emerging consensus on poverty. (12 Marks)

Q 5. (a)

- Discuss how rapid population growth affects poverty and economic development. What are the main reasons behind the high fertility in Africa? What are some potential remedies to alleviate the high fertility rate? (15 Marks)

(b)

- Why has Africa recorded sterling economic growth in the last 15 years and yet pervasive poverty is still the order of the day?

UNIVERSITY OF NAIROBI

UNIVERSITY EXAMINATIONS 2014/2015

(MODULE I & II)

FOURTH YEAR EXAMINATIONS FOR THE DEGREES OF BACHELOR OF ECONOMICS

XEA 406 - POVERTY AND DEVELOPMENT

DATE: APRIL 14, 2015

TIME: 9.00 A.M. - 11.00 A.M.

INSTRUCTIONS:

Answer Question ONE and any other TWO Questions.

QUESTION ONE (COMPULSORY) - 30 MARKS

(a) Consider the following information about country X and Y.

Indicators	X	Y	
Life expectancy at birth	55.6 yrs	67 yrs	Ac, 80
Adult Literacy Ratio	73.6%	61.3%	(O, 100)
Combined Gross enrollment in Education	59.6%	45.2%	(O, 100)
GDP Per Capita (PPG \$)	1,622	2,500	100, 100, 100

(i). Find the Life Expectancy Index, Education Index and Income Index for each country.

(ii) Calculate the HDI for each country and interpret your results.

(iii) Discuss the performance of each country relative to the other and provide policy prescription that can reduce poverty and enhance development.

(b) The following information is given on the cumulative population and income.

Cumulative Population (%)	0	20	40	60	80	100
Cumulative Income (%)	0	4	10	23	50	100

Construct a Lorenz Curve and enumerate its significance in measuring inequality and promotion of development. What are the problems with Lorenz Curve?

PF.CM - min
Max - max

W, 23.6 - 25

~~QUESTION ONE~~

- (c) Handley, Higgins and Sharma (2009) in their article titled, "Poverty and Poverty Reduction in sub-Saharan Africa: An Overview of Key Issues" discusses FOUR socio-economic drivers and maintenance of poverty in Africa. Identify and explain clearly how they drive poverty.

QUESTION TWO (20 MARKS)

- (a) Discuss the FOUR criteria for measuring inequality. [10 marks]

(b) Paul Collier (2007), "Poverty Reduction in Africa" argues that Poverty in Africa has been rising for the last quarter of a century while it has been falling in the rest of the world. Explain the main reasons for this according to the author. [10 marks]

QUESTION THREE (20 MARKS)

- (a) Explain the three objectives of development according to Todaro. [10 marks]

(b) Dutt and Banerji (2007), "The Economic Lives of the Poor" gives an account of the nature of poverty in developing countries. What is the main thrust of the article? [10 marks]

QUESTION FOUR (20 MARKS)

- (a) Discuss the key features of Poverty in developing countries. [10 marks]

(b) Tim Beske (2012) in his paper "The Interrelationship linking Growth, Inequality and Poverty in Sub-Saharan Africa" argues that at micro-level, many households are subjected to a multiplicity of poverty traps. Explain the poverty traps discussed by the author. [10 marks]

QUESTION FIVE (20 MARKS)

- (a) Discuss how rapid population growth affects poverty and Economic Development. What are the main reasons behind the high fertility in African society? What are some potential remedies to alleviate the high fertility rate? [10 marks]

(b) Andy McKay (2012) in his paper, "Growth and poverty reduction in Africa in the last two decades". Evidence from an AERC Growth - Poverty Project and Beyond" discusses the growth prospects of sub-Saharan Africa. Why has Africa recorded sterling economic growth in the last 15 years and yet Pervasive Poverty is the order of the day. [10 marks]

MARKING SCHEME

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (COMPULSORY) - 30 MKS

(a). The following information is given about country X and Y

Indicators	X	Y
Life Expectancy at Birth	65.6 Years	77 Years
Adult Literacy Ratio	83.6%	71.3%
Gross Enrolment in Education	69.6%	55.2%
GDP Per Capita(PPP\$)	2622	3500

(i). Determine Life Expectancy Index, Education Index and Income Index for Country X

$$\text{Life Expectancy Index} = \left(\frac{65.6-25}{85-25} \right) = \frac{40.6}{60} = 0.677 \quad \checkmark$$

Method: $\frac{\text{Actual Value}}{\text{Max Value}} \times 100 \quad (\text{GDP part})$

Education Index = weighted average of the adult literacy rate (ALR) and Gross Enrolment rate(GER)

$$= \frac{2}{3} ALR + \frac{1}{3} GER$$

$$= \frac{2}{3} ALR + \frac{1}{3} GER$$

$$ALR \text{ Index} = \frac{83.6-0}{100-0} = \frac{83.6}{100} = 0.836$$

$$= \frac{2}{3} (0.836)$$

$$GER \text{ Index} = \frac{69.6-0}{100-0} = \frac{69.6}{100} = 0.696$$

$$+ \frac{1}{3} (0.696) + \frac{1}{3} \left(\frac{GER-0}{100-0} \right)$$

$$\text{So Education Index} = \frac{2}{3} * 0.836 + \frac{1}{3} * 0.696 = 0.789$$

$$= \frac{2}{3} \left(\frac{ALR-0}{100-0} \right) + \frac{1}{3} \left(\frac{GER-0}{100-0} \right)$$

$$\text{Income Index} = \frac{\log 2622 - \log 100}{\log 40,000 - \log 100} = 0.545$$

$$= \frac{\log 2622}{\log 40,000}$$

(ii). Determine Life Expectancy Index, Education Index and Income Index for Country Y

$$\text{Life Expectancy Index} = \left(\frac{77-25}{85-25} \right) = \frac{52}{60} = 0.867 \quad \checkmark$$

$$= \frac{\log 77}{\log 40,000}$$

Education Index = weighted average of the adult literacy rate (ALR) and Gross Enrollment rate(GER)

$$= \frac{2}{3} ALR + \frac{1}{3} GER$$

$$ALR \text{ Index} = \frac{71.3-0}{100-0} = \frac{71.3}{100} = 0.713$$

$$GER \text{ Index} = \frac{55.2-0}{100-0} = \frac{55.2}{100} = 0.552$$

$$\text{So Education Index} = \frac{2}{3} * 0.713 + \frac{1}{3} * 0.552 = 0.659$$

$$\text{Income Index} = \frac{\log 3500 - \log 100}{\log 40,000 - \log 100} = 0.593$$

(iii). Calculate the HDI for each country and interpret your results

$$\text{HDI for Country X} = \frac{1}{3}(0.667 + 0.789 + 0.545) = 0.667$$

$$\text{HDI for Country Y} = \frac{1}{3}(0.867 + 0.593 + 0.659) = 0.706$$

(iv). Discuss the performance of each country and provide policy prescriptions that reduces poverty and enhances development

Performance

- Country Y has high life expectancy compared to Country X
- Country X has better education indicator compared to Country Y
- Country Y has higher income indicator compared to Country X
- Country Y in overall, is more developed than Country X

Policy Prescriptions:

Country X should embrace policies that increase life expectancy

Country Y should embrace policies that promote literacy

Country X should embrace policies that leads to income generation

(b). Paul Collier (2007), "Poverty reduction in Africa" argues that the number of people in absolute poverty has been in decline for the last 25 years globally whereas in Africa, an increase is still being recorded. The author claims that an interaction of physical and human geography creates THREE acutely difficult problems for African Economic Development. Discuss these problems and the FOUR policy implications to reduce poverty in Africa according to the author.

The interaction of the two creates three acutely difficult problems for African economic development.

(i) Resource-rich and ethnically diverse societies

Africa's current economic opportunity is its natural resources rents. A disproportionate share of Africa's population lives in resource-rich countries, and for the foreseeable future commodity prices are going to be high with discoveries skewed towards the region. Large resource rents imply a large state and hence the central importance of effective public spending, but also make democracy detrimental to the growth process. It seems that the typical resource-rich country might grow faster under autocracy. However, Africa's high ethnic diversity makes autocracy damaging: Africa's resource-rich countries may not have the option of growth through autocracy. Further, ethnic diversity weakens the ability of the society to hold public services accountable. Because such collective action is more difficult, an ethnically diverse society is best-suited to a relatively small domain of the state.

However, resource-rich Africa does not have the option of a small public sector: resource rents inevitably accrue to the government and will largely be spent by it's what sort of political system would best serve a resource-rich and ethnically diverse country such as is commonly found in Africa? Autocracy may be irredeemably dysfunctional in the context of ethnic diversity, but democracy is not irredeemably dysfunctional in the context of resource rents. The form of polity that appears to be best suited to ethnically diverse societies with resource rents is a democracy with unusually strong checks and balances and decentralized public spending.

(ii) Resource-scarce societies with small, diverse populations

The second problem due to the interaction of physical geography and human geography is that coastal, resource-scarce Africa has missed its opportunity to break into global markets for labor-intensive goods and services. What were the critical factors that decided firms against an African location in the 1980s? In Francophone Africa, the overvaluation of the CFA franc precluded export diversification. Lusophone Africa was beset by civil war. South Africa was in the late stages of the apartheid regime. Among the other coastal, resource-scarce countries, Ghana, Tanzania and Madagascar were in crises as a result of experiments with socialism, and Kenya was beset by the ethnic politics of redistribution. Mauritius was the only coastal, resource-scarce country not precluded from manufactured exports by such misfortunes. However, as discussed above, Africa was prone to these disparate syndromes due to the problems generated by its distinctive human geography. Its societies were too small and diverse to provide the public goods of security and good economic policy. Africa has substantially succeeded in surmounting these problems: its human geography inflicted prolonged but not permanent disadvantages. Although on average African economic governance remains significantly weaker than other regions, there are now several coastal, resource-scarce countries where governance has improved, notably

Ghana, Kenya, Tanzania, Senegal and Madagascar, yet even these countries have still not decisively broken into global markets.

The most probable explanation for the slow pace of export penetration is that Africa missed the boat. The policy mistakes happened to occur at precisely the critical time when Africa could otherwise have broken in on level terms with Asia. Now, Asia has huge agglomeration advantages and so reasonable policies are not enough. The logic of the new economic geography is that Africa will have to wait until the wage gap between Africa and Asia is approximately as wide as that between the OECD and Asia at the time when Asia broke into OECD markets, a process that would take decades.

(iii) Slow-growing economies with small, diverse populations

The final problem generated by the interaction of human and physical geography is heightened risk of violent internal conflict. African countries have characteristics that globally make a country prone to such conflict. As discussed above, the key consequence of Africa's distinctive geography has been slow growth and hence the perpetuation of low income. Yet globally, slow growth and low income are both important risk factors making violent conflict more likely. This is compounded by dependence upon natural resource exports which again globally makes violent conflict more likely. The core social characteristics of the typical African country, a small but ethnically diverse population, are also globally important risk factors. Finally, globally civil war tends to be recurrent.

Post-conflict situations are fragile. Africa's tendency towards these risk factors accounts for why the region has had so much civil war.

There is evidence that international security interventions can be effective in these environments. Collier, Hoefler and Soderbom (2007) analyze 66 post-conflict situations and find that international peacekeeping substantially and significantly brings down the risks of reversion to conflict. Similarly, Doyle and Sambanis (2006) find that while UN operations are not able to end wars, they are effective at maintaining post-conflict peace. Yet post-conflict situations in Africa have typically attracted far fewer international peacekeepers than those of other regions for obvious reasons of geo-political interest. Collier, Hoefler and Rohner (2006) analyze globally the characteristics that make a country prone to the initial onset of conflict. They find that for the thirty years 1965-1995 during which France provided informal security guarantees to Francophone Africa these countries had an incidence of civil war onset only one third of that which would otherwise have been predicted. Following the Rwandan atrocities of 1994 France abandoned this policy of guarantees. Hence, neither peacekeeping nor guarantees are currently being deployed to a degree that seems commensurate with their effectiveness.

Policy Implications

However, the interactions of physical and human geography have created intractable and important problems that have yet to be addressed and which probably need both regional and international action.

(i). One is how to manage resource-rents-in-the context of ethnic diversity. The most appropriate polity is a design that such countries tend not to have: strong checks and balances on how governments can use power and decentralized public spending. This is a political challenge for the resource-rich African states. The international community can also do much to assist African societies to build the necessary checks and balances by setting out templates such as the *Extractive Industries Transparency Initiative* and by reform of banking secrecy to make the embezzlement of resource rents more difficult. In these resource-rich states the international community may have more scope for poverty reduction through such governance policies than through its traditional reliance upon aid.

(ii). The second problem is how to compete with Asia despite having let Asia get decisively ahead. International action will be needed to give coastal, resource-scarce Africa a second chance by temporary preferential market access that offsets Asian economies of agglomeration. For these countries international trade policies may be more important for poverty reduction than additional aid, or at least be a useful complement to aid.

(iii). The third problem is proneness to violent internal conflict. Because of the large regional economic spillovers, this is a regional issue. However, there may be scope for expanding international peacekeeping and security guarantees, a recent model being the military support for Sierra Leone provided by Britain. Such security interventions may need to become integral to international strategy for African poverty reduction.

(iv). The fourth, and perhaps least tractable problem, is that so much of Africa's population lives in landlocked, resource-scarce states. I have discussed how, because these states have multiple forms of dependency upon neighbors, Africa needs a strong regional political architecture that can internalize these externalities. Despite a plethora of regional and sub-regional institutions, African states have to date been unwilling to cede sufficient sovereignty to make them effective (Collier, forthcoming). In the absence of a regional political solution, the international community will need to rethink its aid strategy. These countries currently lack realistic opportunities to reach middle-income levels of development. They are thus the epicenter of the future poverty problem.

Hence, poverty reduction in these societies is likely to need large and sustained aid inflows, not so much for investment in economic development, but rather for the direct raising of consumption levels. At present there is no such category of aid, nor a mechanism for sustained delivery to poor people. Humanitarian aid, which indeed is intended directly to raise consumption, is designed only to meet short term emergencies. Long term aid, while targeted towards low-income countries, is currently intended to raise income. The international community has not yet faced the prospect that even with our best efforts these societies are likely to remain low-income for a long time.

(c). The main focus of development theories is to provide additional explanation why there is a big divergence in living conditions of people across the world and how these nations can converge. Explain the Neo classical counter-revolution theory of Economic Development in Africa.

- This model argues that underdevelopment is the result of poor resource allocation due to incorrect pricing policies and too much state intervention.
- The model believes in free-markets and dismantling of public ownership of resources.
- This theory argues that the countries that developed allowed free markets to prosper while those that did not develop had too much government intervention.

QUESTION TWO-20MKS

(a). Haadley, Higgins and Sharma (2009) in their journal article, "poverty and poverty reduction in sub-saharan Africa: An overview of Issues" discusses the political-economy drivers and maintainers of poverty in SSA. Explain Six of these policies.

(i). Non-developmental politics

Certain aspects of Africa's political systems tend to hinder transformational change and poverty reduction efforts. This is because deep social forces create power relations, often referred to as a 'neopatrimonial' or 'hybrid' state,⁵ that share a number of characteristics. These include (i) a weak separation of the public and private spheres; (ii) the private appropriation of public resources (corruption); (iii) a regular use of clientelism, nepotism, and other vertical exchange relationships to maintain power; (iv) weak cross-cutting horizontal interests and relationships; (v.) the zero-sum(winner-take-all) nature of politics; (vi) a concentration of power in an individual ('presidentialism') who stands above the law; (vii) an absence of issue-based politics and political parties; and (viii) patron-client relations that are replicated at and link all levels of society.

(ii). Corruption

The abuse of public office for private gain is the norm in such states. This is manifest in a number of different ways. Certainly bribery and kickbacks for public procurement aid for escaping taxes and customs charges are common. The embezzlement of government funds, and the sale or misuses of government property are seen frequently. For instance, civil servants will establish small supply companies simply to provide goods at inflated prices to the ministries where they work.

(iii). Weak nations, weak states

African national boundaries are largely a colonial heritage; they were laid down with little regard for the local residents' identities. This has resulted in countries that are marked by ethnic and religious diversity, which has been transformed into ethnic and religious conflict (at local or national level) by unscrupulous politicians, resource constraints, and discrimination. The Rwandan genocide is a case in point, but so are conflicts in Darfur and northern Nigeria. In many countries, large territories are outside the control of the central government, and warlords rule through force of arms, which they often acquire by selling 'blood' resources (diamonds, coltan, timber, etc.).

(iv). Weak civil society

Most Africans live rurally. Many know little of the world outside their villages, except what they hear on the radio. Getting to schools, clinics, towns and the capital city is difficult due to poor roads and transport links. In many countries people living in one region have little contact with, or knowledge of those living in other areas. Taken together this creates a society that prioritises local connections (family and clan, tribal, religious, regional) rather than a shared national identity. It is also difficult for them to relate to the problems of those hundreds of miles away, or if they do, to organise for change. This is what is meant when analysts speak about African civil society being 'weak'.

(v). Human rights

Development is often linked to human rights as multiple rights denials can cause and shape poverty. Multidimensional poverty may be expressed as a denial of specific human rights, e.g., the right to education, health, livelihoods, etc. Social, economic and cultural rights are particularly relevant in this context (United Nations, 1966a; United Nations General Assembly, 1986).

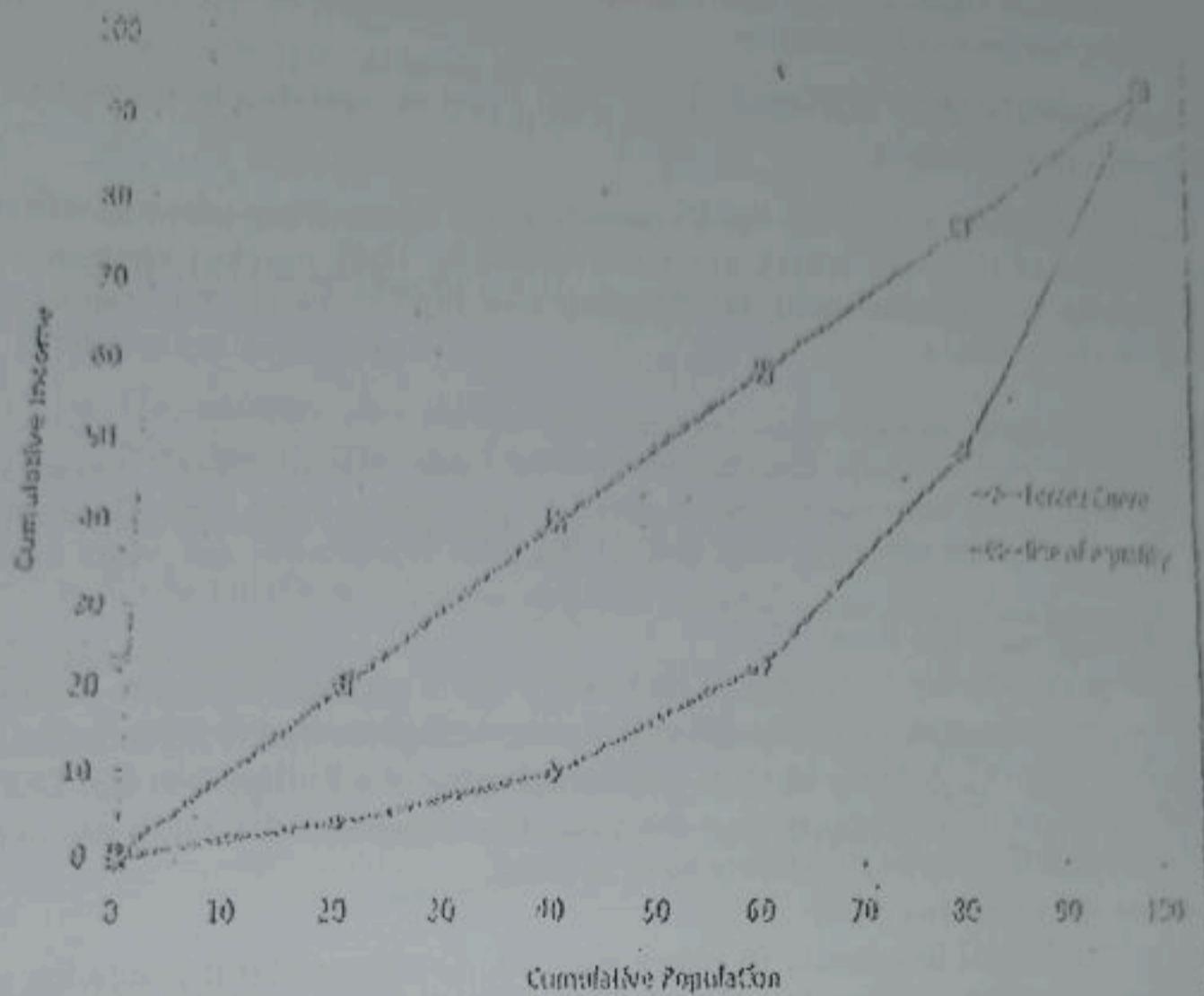
(vi). Resource curse

While these socio-political issues independently affect poverty and poverty reduction, it is easiest to see their impact when we speak about the resource curse. Resource endowments – such as oil, gas, coltan, diamonds, hardwoods – can become a 'curse' in the face of the political incentives and policy failures they generate (Robinson et al., 2005). Indeed, 'policy failure [is] the prime cause of the underperformance of the resource abundant countries' (Lal and Myint, 1996).

b) Explain the Significance of Lorenz Curve in measuring inequality. What are the problems of Lorenz Curve?

- ✓ The distribution of income is always indicated by the Lorenz curve. Lorenz curve is a graphical representation of the cumulative distribution function of the empirical probability distribution of wealth.
- ✓ It's a graph showing the proportion of the distribution assumed by the bottom X% of the values.
- ✓ It's often used to represent income distribution where it shows for the bottom X% of total income they have.
- The % of households or population is plotted on the X axis while the % of income is plotted on y axis.
- ✓ It can be used to show the distribution of assets therefore many economists consider it to be a measure of social inequality.

- ✓ It was developed by Max O. Lorenz in 1905 for representing the inequality of the wealth distribution. The concept is useful in describing inequality among the size of the individuals in the population. It's also useful in business modeling.
- ✓ Every point on the Lorenz curve represents a statement like "the bottom 20% of all households have 4% of total income" etc.
- ✓ A perfect income distribution would be one in which every person has the same income. In this case the bottom N % of the society would always have N % of the total income. This is depicted by the straight line referred to as the line of perfect equality.
- ✓ The Lorenz curve indicates that the degree inequality is initially low/small then it widens and later decreases.
- ✓ Lorenz curve shows the relationship between the % of income of the recipients and % of income they receive.
- ✓ Lorenz curve should not cross if they cross, and then there is a regressive transfer from one distribution to the other.
- ✓ The Gini coefficient is the area between the line of perfect equality and the observed Lorenz curve as a % of the area between the line of perfect equality and the line of perfect inequality.



Problems with Lorenz curve

- Policy makers and researchers are often interested in summarizing inequality by a number or a %. This is not precisely indicated in the Lorenz curve
- When Lorenz curve cross, they cannot provide useful inequality ranking

QUESTION THREE-20MKS

(a). Explain the FIVE Mechanisms through which social capital and Safety Nets affects the poverty and development status of countries according to Maneti, 1993.

- * Improves society's ability to monitor the performance of the government either because government officials are more embedded in social network or because monitoring public provision of services is a public good.
- * Increase possibilities for cooperative actions in solving problems with a local common property elements/goods

- Facilitate the diffusion of innovations by increasing inter-linkages among individuals.
- Reduce information imperfections and expand the range of enforcement mechanism so that everybody has perfect information.
- Increase informal insurance (informal safety nets) between households because of the social networks of individuals.

(b). Duflo and Banerjee (2007) article on the Economic Lives of the Poor gives an account of the economic choices of the poor which are constrained by their market environment. Explain the FOUR main issues influencing the Markets and the Economic Environment of the Poor according to the authors.

(i). The Market for Credit and the Poor

The data from our 13 countries suggests that the fraction of rural, extremely poor households having an outstanding debt varies between countries, from 11 per cent in rural East Timor to 93 percent in Pakistan. But across the surveys, very few of the poor households get loans from a formal lending source.

(ii). The Market for Savings and the Poor

A main challenge for the poor who try to save is to find safety and a reasonable return. Stashing cash inside your pillow or elsewhere at home is neither safe nor well-protected from inflation. In addition, recent research by Asbraf, Karlan, and Yin (forthcoming) in the Philippines and Duflo, Kremer, and Robinson in Kenya (2006) suggests that the poor, like everyone else, have problems resisting the temptation of spending money that they have at hand.

(iii). The Market for Insurance and the Poor

The poor have little access to formal insurance. In many surveys, questions about insurance are not even asked. In the six of our seven countries where such data is available, less than 6 percent of the extremely poor are covered by health insurance of any kind. The exception is Mexico, where about half of the extremely poor have coverage. The numbers are not much higher in urban areas. Life insurance is a bit more common in India (and is, essentially, a form of savings). Four percent of the extremely poor in Udaipur and 10 percent in Hyderabad have life insurance.

(iv). The Market for Land and the Poor

For historical reasons, land is the one asset the poor tend to own. But land records in developing countries are often incomplete and many people do not have titles to their land. As many including most famously Hernando De Soto (2003) have emphasized, an unclear title makes it harder to sell the land or mortgage it. This situation is especially troubling for the poor, because they tend to own a lot of the land that was either recently cleared or recently encroached upon, which is typically the land where tilling is incomplete. Erica Field (2006) suggests that, in Peru, the poor spend a lot of time protecting their claims to the land (since they have no title, they have no legal recourse).

QUESTION FOUR-20MKS

(a). Explain the FOUR criteria of measuring inequality in developing countries. How are they relevant in poverty reduction in Africa?

~~Q~~ Anonymity principle

- It does not matter who is earning the income.

~~Q~~ Population principle

- Population size does not matter, only the proportions of the population that earn different levels of income.

~~Q~~ Relative income principle

- Only relative income should matter, not the absolute ones.

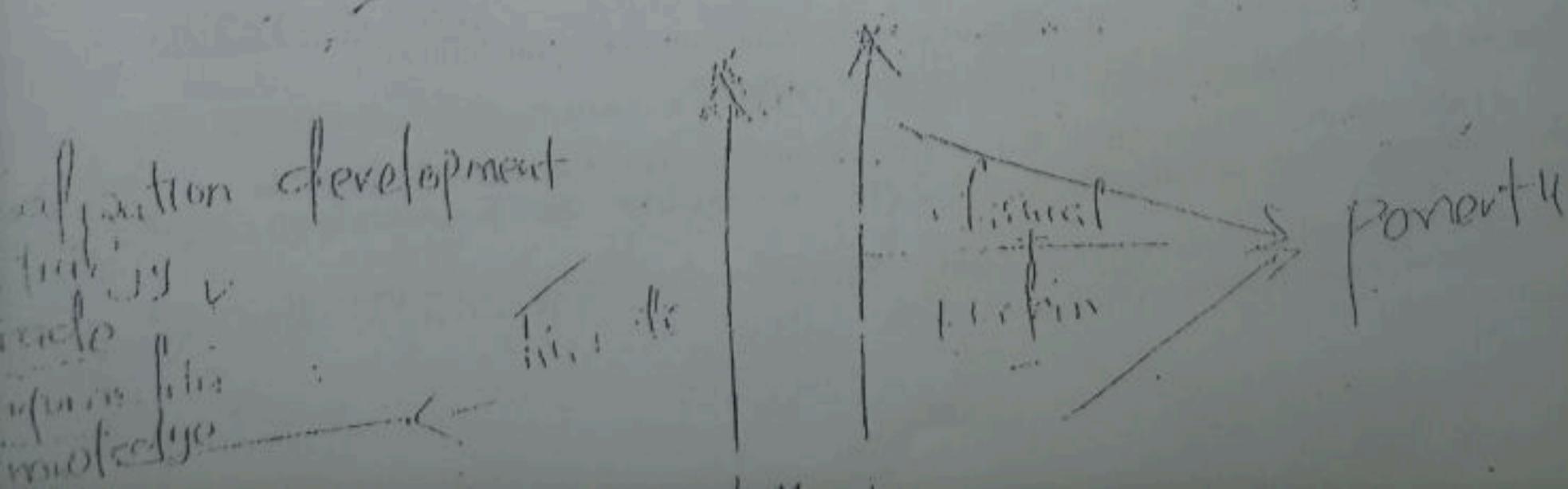
~~Q~~ Dalton principle

- If one income distribution can be achieved from another by constructing a sequence of regressive transfers, then the former distribution must be deemed more unequal than the latter.

b). Burgess and Besley (2008) in their article, "Halving Global Poverty" discusses the Role of Economic Growth in Reducing Poverty. Explain the THREE main sources of economic growth in this context according to the authors.

The main sources of economic growth are

- (i). Accumulating Human Capital: The acquisition of human capital by the poor results in their earning higher wages.
- (ii). Physical Capital: Since various forms of capital constraint (due to imperfect capital markets) may inhibit the income sources of the poor, increasing capital formation can, in theory, yield a disproportionate advantage to the poor.
- (iii). Technological Change: Adoption of agricultural technologies, such as higher-yielding crop varieties, may raise the incomes of the poor.



QUESTION FIVE-ZIMBOS

(a). Write brief notes on the following topics as used in poverty and development

~~Q1.~~ Macroeconomic Policies and Poverty

- Since macroeconomic stability is essential for high and sustainable rates of growth, macroeconomic policies therefore have a direct link to poverty.
- The main links between macroeconomic policy and poverty reduction is through the economic growth. The higher the economic growth the lower is the poverty and vice versa.
- Macroeconomic stability exists when key economic relationships are in balance e.g. between domestic demand and output, the balance of payments, the physical revenues and expenditure and savings and investment, the following macroeconomic policies are key in poverty reduction:
 - ✓ Growth
 - ✓ Stabilization (using monetary or fiscal policies)

~~Q2.~~ Poverty reduction policies

The United Nations Millennium Development Goals recognizes poverty reduction strategies as tools of reducing poverty. The Poverty Reduction Strategy Papers (PRSP) originated from the IMF and World Bank in 1999 (PRSP). They were meant to replace the structural adjustment programme and be aligned to the MDGs. The core principles of PRSP approach were;

- ✓ Country driven e.g. promoting national ownership of strategies through broad-based participation of civil society.
- ✓ Result oriented e.g. focused on outcomes that will benefit the poor.
- ✓ Comprehensive in recognizing the multidimensional nature of poverty.
- ✓ Partnership oriented i.e. involving coordinated participation of development partners (government, domestic stakeholders and external donors)
- ✓ Based on long-term perspective of poverty reduction.

In order to further improve the effectiveness of poverty reduction process the following objectives must be adhered to. These are objectives or strategies.

- Help countries design realistic and yet flexible macroeconomic frameworks linked to national strategies and budgets.
- Align the country's funds operations and programme work as closely as possible with domestic cycles including PRSP and budgets.

UNIVERSITY OF NAIROBI
MODULE II DEGREE PROGRAMME 2019/2020

**FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF
ECONOMICS AND STATISTICS**

XET 402: INSTITUTIONAL ECONOMICS

DATE: JANUARY 14, 2020

TIME: 9.00 A.M. – 11.00 A.M.

INSTRUCTIONS

Answer Question **ONE** and any other **TWO** Questions

QUESTION ONE (COMPULSORY)

- a) Discuss the key sentiments of the old and new institutional economics. (10 Marks)
- b) Briefly discuss two broad types of institutions. (4 Marks)
- c) Briefly discuss the difference between Arrow-Debreu contracts and comprehensive contracts. (4 Marks)
- d) Discuss the dynamics of and complexity of institutions. (6 Marks)
- e) Using a two-person Assurance Game, illustrate how the need for trust arises. (10 Marks)

QUESTION TWO

- a) Discuss the Williamson's framework used in institutional economics. (8 Marks)
- b) Compare and contrast Williamson's and Coase's approach to the theory of the firm. (10 Marks)
(2 Marks)
- c) Define Coase Theorem

QUESTION THREE

- * ~~a)~~ Briefly state the difference between role of government in institutional economics and neoclassical economics. (2 Marks)
- * ~~b)~~ List four forms of corruption (4 Marks)
- * ~~c)~~ Briefly describe the state of corruption in Kenya. (6 Marks)
- * ~~d)~~ Why do nations fail according to Acemoglu and Robinson? (6 Marks)

QUESTION FOUR

- * ~~a)~~ What is the source of property rights? (5 Marks)
- * ~~b)~~ Briefly discuss the three forms of social capital (6 Marks)
- * ~~c)~~ Using examples, discuss how social capital affects economic outcomes. (9 Marks)

QUESTION FIVE

- * ~~a)~~ What is the link between time-inconsistency and social capital? (5 Marks)
- * ~~b)~~ Using a two player game theory example, explain how externalities of actions creates a demand for norms. (9 Marks)
- * ~~c)~~ Briefly discuss the trust rule. (6 Marks)

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UNIVERSITY EXAMINATIONS 2018/2019

FOURTH YEAR EXAMINATIONS FOR THE DEGREES OF BACHELOR OF
ECONOMICS &

BACHELOR OF ECONOMICS AND STATISTICS

XET 402; INSTITUTIONAL ECONOMICS

DATE: JUNE 4, 2019

TIME: 11.30 A.M – 1.30 P.M.

QUESTION ONE (30 marks)

- a. ~~(i)~~ Define and discuss the importance of institutions using examples. (6 marks)
~~(ii)~~ Explain why institution of governance is referred to as 'the play of the game' in Williamson's framework in Institutional Economics. (4 marks)
~~(iii)~~ Using examples show the difference between organization arrangements and institutions. (5 marks)
- b. A firm that manufactures leather shoes pollutes a river enjoyed by individuals. If the firm ignores individuals, there is too much pollution. (3 marks)
- Using a graph show the deadweight loss due to pollution. (3 marks)
 - If the individuals own the river and charge the firm Kshs.100 shillings per shoe produced, show how the firm can internalize the externality and remove the inefficiency of the negative externality. (3 marks)
 - If the river is owned by the firm, show how the firm can charge the individuals for polluting less assuming the pollution cost as in b(ii) above. (3 marks)
 - Show how the industrial policy can remedy the externality using a tax. (3 marks)
 - In this example, is private sector solution better than public sector solution and why? (3 marks)

QUESTION TWO

- a. Discuss why a firm is considered 'a black box' in mainstream economics. (5 marks)
- * b. Explain the use of bounded rationality in Coase's theory. (10 marks)
- c. Using an example, show how a firm can be substitute of the market.

QUESTION THREE

- a. Discuss the importance of contracts in economics. (6 marks)
- b. Explain the complete incentive contracts using an example. (10 marks)
- * c. Why is it difficult to have contractual completeness? (4 marks)

QUESTION FOUR

- a. Discuss the causes of imperfect markets. (6 marks)
- b. Using an example, show how a government policy can remove market failure. (8 marks)
- c. 'Governments cannot pick winners' in a market. Discuss. (6 marks)

QUESTION FIVE

- * a. Discuss the role of property rights in economics. (10 marks)
- b. Discuss the importance of social capital in economic development. (10 marks)

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UNIVERSITY EXAMINATIONS 2017/2018

FOURTH YEAR EXAMINATIONS FOR THE DEGREE OF BACHELOR OF ECONOMICS

XET 402: INSTITUTIONAL ECONOMICS

DATE: OCTOBER 25, 2018

TIME: 2.00 P.M. – 4.00, P.M.

INSTRUCTIONS:

Attempt Question One and Two other Questions

Question One

- * Explain the difference between formal and informal institutions using examples. (6 marks)
- b. Discuss the William's Framework used in Institutional analysis (9 marks)
- c. Define the following concepts: (15 marks)
- * (i) Coase Theory
 - * (ii) Transaction costs
 - * (iii) Institutional Economics
 - * (iv) Asset specificity
 - * (v) Bounded irrationality

Question Two

- * Explain the difference between neoclassical and institutional economics definition of a firm. (6 marks)
- * Discuss the nature and the boundaries of the firm using the Coase and William's Theory of the firm. (8 marks)

(iii) Explain why a firm can be defined as a collection of assets with incentive mechanism. (6 marks)

Question Three

a. Explain the difference between comprehensive contracts and complete contracts. (6 marks)

* b. Using principal and agency problem, show how incentives can reduce moral hazard. (8 marks)

c. Define and discuss causes of incomplete contracts. (6 marks)

Question four

a. Discuss the different forms of social capital. (8 marks)

* b. Using examples show how social capital can influence economic outcomes. (6 marks)

* c. Explain how social capital is to be created. (6 marks)

Question Five

a. Discuss the causes of market failure. (6 marks)

b. Using examples explain the causes of transaction costs. (8 marks)

* c. Discuss the limitations of Coase theorem (6 marks)

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SCHOOL OF ECONOMICS

XET 402: INSTITUTIONAL ECONOMICS
CONTINUOUS ASSESSMENT TEST

Date: 24.05.2019

Attempt all Questions

Question One

Define the following concepts (15 marks)

- * a. Institutional Economics
- * b. Transaction costs
- * c. Residual right of control
- * d. Social capital
- * e. Market failure

Question Two

A Firm that manufactures leather shoes pollutes a river enjoyed by individuals. If the firm ignores individuals, there is too much pollution.

- a. Using a graph show the deadweight loss due to pollution. (3 marks)
- b. If the individuals own the river and charge the firm kshs 100 shillings per shoe produced, show how the firm can internalize the externality and remove the inefficiency of the negative externality. (3 marks)
- c. If river is owned by firm, show how the firm can charge the individuals for polluting less assuming the pollution cost as in (b) above (3 marks)
- d. Show how the Industrial policy can remedy the externality using a tax. (3 marks)
- e. In this example, is private sector solution better than public sector solution and why? (3 marks)