Undergraduate Admissions Assessment March 2019
TEST 2 - (Sections A, B2 and C). Three Hour Assessment.

The UG Admissions Assessment (UGAA) gives Admissions Tutors the opportunity to see a sample of the applicant's original work, produced under examination conditions, and seeks to assess applicants from a variety of backgrounds in a fair and equitable manner.

The assessment has three sections: comprehension exercises (**Section A**); essay questions (**Section B**); and mathematical problems (**Section C** *or* **D**). The purpose is to assess the applicant's English language and mathematics abilities. *It is not an assessment of general knowledge.* The following criteria are of particular importance:

- Clarity and precision of language
- Sophisticated vocabulary
- Logical structure and argument
- Mathematical accuracy, techniques and conceptual understanding

Before beginning the assessment, please read the following guidance and instructions carefully.

Depending on the course to which you have applied, you have been entered for Test 1 or 2. Before beginning the assessment please check that you have received the correct paper. A list of courses and corresponding papers can be found overleaf.

The assessment lasts three hours and **all three sections must be completed**. The marks for each section are weighted according to the paper. More time should be spent completing the sections with more marks attached. However, please note that to pass the UGAA a minimum grade in *all three sections* is required, as well as a good grade overall.

Test 1: Section A **(25%)**, Section B1 **(25%)**, Section D **(50%)**
Test 2: Section A **(25%)**, Section B2 **(50%)**, Section C **(25%)**

Answer Booklets

You must use the **BLUE** booklet for Sections A and B (English Sections) and the **YELLOW** booklet for Sections C or D (Maths Sections).

When answering the maths questions, you must show your working out, as well as your final answer.

- Dictionaries may **NOT** be used
- Hand-held calculators **MAY** be used.

If a calculator is used please indicate on the answer booklet the type used (e.g. TI.500)

Test Papers

TEST 1

BSc Actuarial Science (N321)
BSc Econometrics and Mathematical Economics (L140)
BSc Economics and Economic History (VL31)
BSc Economic History with Economics (V3L1)
BSc Economics (L101)
BSc Economics with Economic History (L1V3)
BSc Environmental Policy with Economics (F9L1)
BSc Finance (N300)
BSc Financial Mathematics and Statistics (GN13)
BSc Geography with Economics (L7L1)
BSc International Social and Public Policy and Economics (LLK1)
BSc Management (N200)
BSc Mathematics and Economics (GL11)
BSc Mathematics with Economics (G1L1)
BSc Mathematics, Statistics, and Business (G0N0)
BSc Philosophy and Economics (LV15)
BSc Philosophy, Politics and Economics (L0V0)
BSc Politics and Economics (LL12)

TEST 2

BSc Accounting and Finance (NN34)
BSc Anthropology and Law (ML16)
BSc Criminology (L611)
BSc Economic History (V300)
BSc Economic History and Geography (V3L7)
BSc Environment and Development (FK84)
BA Geography (L702)
BA History (V146)
BSc International Relations (L250)
BSc International Relations and Chinese (L2T1)
BSc International Relations and History (VL12)
BSc International Social and Public Policy (L400)
BSc International Social and Public Policy with Government (LL42)
BSc Language, Culture and Society (L3R9)
BSc Philosophy, Logic and Scientific Method (V503)
BSc Politics (L230)
BSc Politics and History (LV21)
BSc Politics and International Relations (L290)
BSc Politics and Philosophy (LV25)
BSc Psychological and Behavioural Science (C800)
BA Social Anthropology (L601)
BSc Social Anthropology (L603)
BSc Sociology (L301)

Please check you have received the correct paper. If you think you have received the wrong paper please notify the invigilator immediately.

The Undergraduate Admissions Assessment

TEST 2

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Section A

- **All** candidates should complete this section.
- This section has **one** question only.
- The marks achieved in this section account for **25%** of your final exam result.

Instructions:

Write a summary (précis) of the following passage, **in not more than 150 of your own words**. You must write a summary, not a discussion of the passage. No credit will be given for answers made up of sentences extracted from the original passage.

The world's leading climate scientists have warned there is only a dozen years for global warming to be kept to a maximum of 1.5C, beyond which even half a degree will significantly worsen the risks of drought, floods, extreme heat and poverty for hundreds of millions of people.

The authors of the landmark report by the UN Intergovernmental Panel on Climate Change (IPCC) released on Monday say urgent and unprecedented changes are needed to reach the target, which they say is affordable and feasible although it lies at the most ambitious end of the Paris agreement pledge to keep temperatures between 1.5C and 2C.

The half-degree difference could also prevent corals from being completely eradicated and ease pressure on the Arctic, according to the 1.5C study, which was launched after approval at a final plenary of all 195 countries in Incheon in South Korea that saw delegates hugging one another, with some in tears….

Policymakers commissioned the report at the Paris climate talks in 2016, but since then the gap between science and politics has widened. Donald Trump has promised to withdraw the US – the world's biggest source of historical emissions – from the accord. The first round of Brazil's presidential election on Sunday put Jair Bolsonaro into a strong position to carry out his threat to do the same and also open the Amazon rainforest to agribusiness.

Jonathan Watts, 'We Have 12 Years to Limit Climate Change Catastrophe, Warns UN,' *Guardian*, 8 October 2018

Please turn over for Section B.

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Section B2

- Complete Section B2 **ONLY** if you are completing Maths Section C.
- The marks achieved in this section account for **50%** of your final exam result.

Instructions:
Write **ONE** essay from the following three choices:

1. Why is populism on the rise?

2. Is the United States losing its place as the world's preeminent power?

3. To what extent, and why, is the rule of law under threat?

Please turn over for Section C.

Section C

- The marks achieved in this section account for **25%** of your final exam result.

- Full algebraic working out must be clearly shown.

Instructions:
This section has **four questions**, with a total of **100 marks**. Answer **all** questions in this section. Give all numerical answers to 3 significant figures.

Question 1

In 2010 the total world CO_2 emissions were estimated to be about 34 Million Gg (1 Gg = 10^9 g). It is estimated that about a quarter of CO_2 emissions are created by the food we eat. Of these emissions from food it is estimated that 60% comes from animal products.

a) Using these estimates, roughly how many Million Gg of CO_2 emissions were from
   i) Food
   ii) Animal products

(3 marks)

b) Using the estimates, what percentage of CO_2 emissions come from animal products?

(2 marks)

c) The table below shows estimates of CO_2 emissions in a particular year.

Year	1990	2000	2005	2010
$C0_2$ emissions (Million Gg)	25	28	32	34

How many kg of emissions were estimated for 1990?

(1 mark)

d) i) What was the increase per year between 1990 and 2000? Give your answer in Million Gg.
   ii) Over which of the time periods shown was the increase per year greatest?

(4 marks)

e) Assuming the increase per year from 2005 to 2010 continues until 2020 what would the estimated CO_2 emissions be for 2020? Give your answer in Million Gg.

(2 marks)

f) Find the percentage increase in CO_2 emissions from

i) 2000 to 2005

ii) 2005 to 2010

(4 marks)

g) Assuming the percentage rate from 2005 to 2010 continued and using your answer to f)ii) what would be the estimated CO_2 emissions for

i) 2015

ii) 2020

(4 marks)

h) A target for 2020 was to cut emissions to become 20% less than they were in 1990.

i) Using your answer to d) and comparing how the increase per year for the two time periods 2000 to 2005 and 2005 to 2010 has changed, explain why it might have been anticipated that from 2010 to 2015 the increase per year would have fallen to 0 and give the anticipated **decrease** per year for 2015 to 2020.

(2 marks)

ii) Continuing this trend in what 5 year period would the 20% less than 1990 target have been met? Explain your reasoning carefully.

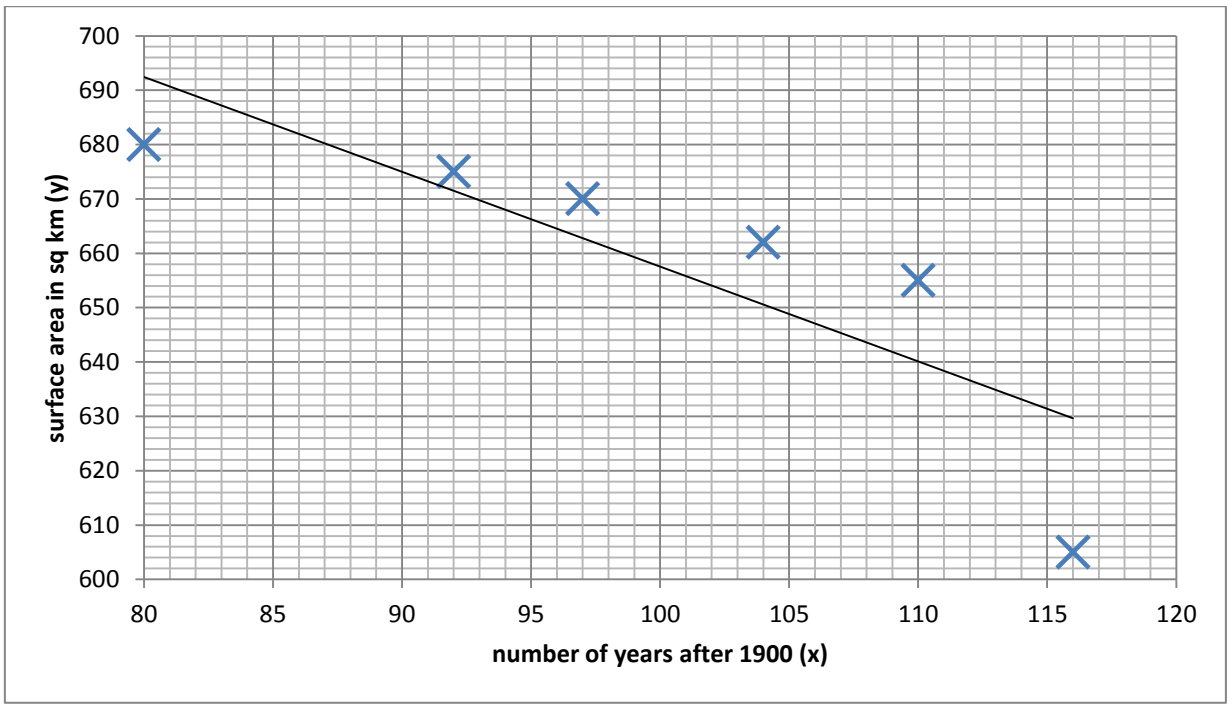
(3 marks)

Total 25 marks

Question 2

The Dead Sea is shrinking.

Nigel has drawn the following graph and trendline to show its surface are in km^2 for the number of years after 1900.



a) What was the surface area in

i) 1980

ii) 2010

(2 marks)

b) For Nigel's **trendline** complete the following coordinates that lie on the line

i) (80, ...)

ii) (....., 640)

(2 marks)

c) Use your answers to b) to work out an equation of the trendline.
Give your answer in the form $y = mx + c$

(5 marks)

d) i) Use your answer to c) to find out the year in which Nigel's trendline would predict that the area of the Dead Sea will fall to 0.

ii) Give a reason why your answer might not be realistic.

(4 marks)

e) Aylish suggests that both the first and the last point are anomalies and that the equation of the trendline should be calculated with just the middle 4 points.

She gets the equation $y = -1.12x + 778$

Use your answer to c) and Aylish's equation to find the year in which Aylish's trendline and Nigel's trendline would both give the same surface area.

(4 marks)

f) Maryam suggests that the trend is not a straight line and uses the following equation:

$$y = -0.0858x^2 + 15.1x + 18.6$$

i) By substituting $x = 116$ into Maryam's equation, show that this might be more reasonable.

ii) Maryam predicts that the surface area will be zero in 2077. Evaluate her prediction.

(6 marks)

g) Harry thinks that the trend is changing and just uses the last two points to get
$y = -8.33x + 1570$
When does Harry think that the surface area will fall to zero?

(2 marks)

h) Who do you think has the best model to fit the data? Give a reason for your answer.

(1 mark)

Total 26 marks

Question 3

The Great Pacific Garbage Patch (GPGP) is estimated to have about 80 million kg of floating debris consisting of 1.8 trillion pieces of plastic. (1 trillion = 10^{12})

a) Find the average mass per piece of plastic in kg.

(3 marks)

b) There are about 7.7 billion people in the world. Calculate how many pieces of plastic there are in the GPGP per person.

(3 marks)

c) 92% of the mass consists of plastics whose size is more than 5mm. The area covered is 1.6 million km^2. Calculate the average mass of micro plastic (whose size is less than 5mm) in kg per km^2

(4 marks)

The table below shows historical estimates of the mass of micro plastic per km^2

year	1970	1980	1990	2000	2010	2015
kg/km^2			0.42	0.52	1.10	2.20

d) By calculating the rate of increase from 2010 to 2015 find an estimate of mass of micro plastic per km^2 in 2020. To what extent does this agree with your answer to c)?

(3 marks)

e) Between 1970 and 2000 the percentage change over each 5 year period was believed to have been constant. Using this assumption calculate the mass of micro plastic per km^2 in 1980 and 1970.

(5 marks)

Total 18 marks

Question 4

a) Felix calculates the distance that he is away from a storm using $D = 0.335\,T$ where T is the time in seconds between the hearing the thunder and seeing the lightning and D is the distance in km.

Find i) D when the time between hearing the thunder and seeing the lightning is 1.5 minutes

ii) T when D is 4.9km

(5 marks)

b) Ethan calculates that for every second between the thunder and lightning the storm is 1 mile away. 1 mile is 1.6 km. Which of Ethan or Felix calculates the nearer distance? Give a reason for your answer.

(3 marks)

Question 4 continues overleaf

c) The speed of sound is 343 m/s and the speed of light is 2.998×10^8m/s. Use these figures to calculate the length of time between the seeing the lightning and hearing the thunder for a storm 1 mile away to decide whose rule is more accurate.

(6 marks)

d) There are two formulae that are used to give the time a storm lasts from its diameter d

Formula A $t = \sqrt{\frac{d}{6}}$

Formula B $t = \sqrt{\frac{d^3}{216}}$

where t is measured in hours and d in miles

i) Find the time in hours and minutes for both formulae when the diameter of the storm is 10 miles.

ii) For both formulae find the diameter of a storm that lasts 2 hours.

iii) Find the diameter of a storm where both formulae would give the same answer. Show full algebraic working.

iv) Assuming that storms are roughly circular use your answer to iii) to calculate the area of the storm in km^2 where both formulae give the same answer.

(17 marks)
Total 31 marks

End of Test