

ASSIGNMENT BRIEF

Summer 2021

HTU Course No: **30202180** HTU Course Name: **Maths for Computing**

BTEC UNIT No: **11 (D/615/1635)** BTEC UNIT Name: **Maths for Computing**

Version: 2



Assignment Brief - Part1

Student Name/ID Number/Section	
HTU Course Number and Title	30202180 Maths for Computing
BTEC Unit Number and Title	(D/615/1635) Unit 11 Maths for Computing
Academic Year	2020-2021, Summer semester
Assignment Author	Eng. Moath Sulaiman
Course Tutor	Eng. Moath Sulaiman
Assignment Title	Euclidia SW
Assignment Ref No	Assignment 6
Issue Date	Aug. 16 th 2021
Formative Assessment dates	18,25 Aug and 1 st Sep.2021
Submission Date	Friday Sep. 3 rd 2021 8:00 PM
IV Name & Date	Eng. Atheer Al-Shaggah 17/8/2021

Submission Format

- The submission of the assignment should be:

For part 1:

- Softcopy of your solutions for the questions provided submitted on <https://elearning.htu.edu.jo>

- The hardcopy submission for part 1 should:

- be written in a concise, formal business style using single spacing and font size 12.
- make use of headings, paragraphs and subsections as appropriate.
- be referenced using the Harvard referencing system as needed. Provide a bibliography using the Harvard referencing system.
- Be word processed document, no handwriting will be accepted.

For part 2:

- Online time-constrained, closed book, closed notes assignment. It will be on Sunday September 5th 2021 @ 11:00 AM on <https://elearning.htu.edu.jo>

Unit Learning Outcomes

- LO1** Use applied number theory in practical computing scenarios.
- LO2** Analyse events using probability theory and probability distributions.
- LO3** Determine solutions of graphical examples using geometry and vector methods.
- LO4** Evaluate problems concerning differential and integral calculus.

Assignment Brief and Guidance

You recently joined a well-known academic institution as a Software Engineer. The institution has issued a purchase order for a new mathematic software called **Euclidia** to be used in campus by students and faculty. On the other hand, the ICT department is responsible for testing the software before deploying it within local area network. Such test will be comprehensive one and covers different aspects such as functionality test to ensure it is working probably, and security test to ensure that there are no backdoors or bugs within the application.

Euclidia can deal with number theory, probability theory, function geometry and vector methods, differentiation, and integration. You were assigned a task of solving the below questions that will be used as a test input for the **Euclidia** application to make sure that the results are accurate.

Part1:

- 1) A patient of Corona disease was directed to take two types of medicine. The first one to be taken once every 5 hours and the second one to be taken once every 13 hours. You need to calculate after how many days she will take both medicines.
- 2) This year, your institution will have its first graduation ceremony. It had 112 monthly subscriptions to Coursera and 84 monthly Gym subscriptions as gifts to be given to some graduates as packages. Each package should contain the same number of each gift. What is the maximum number of graduates that will have gifts such that they all have the same number of each subscription? How many monthly subscriptions of both Coursera and Gym each graduate will get?
- 3) In modular arithmetic, define the concept of multiplicative inverse and identify minimum three of multiplicative inverse pairs in mod 8.
- 4)
 - a. A computer network signal is transmitted over a twisted pair cable of 100m in length. Due to electrical resistivity of the copper, the signal is degraded as it passes via the wire. It was found that the voltage of the signal, measured every 10 meters, in volts had the following values: 5, 4.9, 4.802, 4.70596, ...etc. **Calculate the sum of those values.**
 - b. In an Anti-Virus management server, it was found that after each daily update to the signature file, its size was increased by 3, 6, 9, 12etc (in KB). If you knew that the initial file size was 100 MB, Find the file size after 90 days.

- 5) In a statistical study, it was found that there are two major causes of car accidents: high speed and inattention. In the same study, 60% of car accidents were caused by male drivers. On the other hand, it was also found that 30% of the “male driver” accidents were due exceeding speed limit and 85% of “female driver” accidents were due inattention. One accident driver was selected at random and his/her accident was due inattention, what is the probability that it is a female driver?
- 6) In a computer memory factory, the probability of having a defected memory chip in the production line is 2%. The quality assurance team selected five Memory chips at random from the production line, let X be a random variable indicating the number of defected chips out of those chips selected by the QA team. Identify and compute the expected value for the random variable X , i.e. $E(X)$.
- 7) In an experiment of rolling a die 8 times, event A is considered success if you get an even number. Calculate:
 - a) The probability that event A is success 5 times.
 - b) The probability of not getting A at all.
 - c) The probability of getting A at least one time.
- 8) Given that (5000) fresh graduates in Jordan participated in a Kafa’a exam held by MOHE. The highest score in this exam is 100. Their results **were normally distributed** with an average of (65) and standard deviation of (10). If you knew that the passing score to get certified is (75), then:
 - a. Find the number of students who passed the exam.
 - b. If (2750) students passed the exam, what was the minimum score achieved? *If needed refer to the z-table available on the Internet.*
- 9) Explain the importance of prime numbers within the field of computing (preferred to provide 350-450 words on a single page and provide references when needed, you will not be penalized if you go beyond word limit).
- 10) Load balancing and hashing are of the most important applications of probability theory. Evaluate probability theory to an example involving hashing and load balancing.
- 11) The power dissipation of an electronic chip on the motherboard of a computer system is defined as: $P = (0.16x^2 - 4)$; where P is the power dissipated and x is some factor related to the input voltage applied on the chip:
 - a) Sketch the function, specifying the axis intersection coordinates if any.
 - b) Is the function even or odd? Explain.
 - c) Specify the intervals in which the function is decreasing or increasing
- 12) If V_1 and V_2 are vectors defined as $V_1 = 5i + 3j - 3k$ and $V_2 = 2i + 2j + 3k$, then:
 - a) determine the angle between the two given vectors.
 - b) determine the scalar and vector products

- c) discuss the effect of scaling V_1 and V_2 by (2) on the resultant vector ($V_1 + V_2$) **use equations and diagrams (before and after scaling) to support your discussion**

13) Explain and evaluate the coordinate system used in programming a simple output device.

Part2: will be online examination covering LO4 on Sunday September 5th 2021 @ 11:00 AM via

<https://elearning.htu.edu.jo>

Learning Outcomes and Assessment Criteria			
Learning Outcome	Pass	Merit	Distinction
LO1 Use applied number theory in practical computing scenarios	<p>P1 Calculate the greatest common divisor and least common multiple of a given pair of numbers.</p> <p>P2 Use relevant theory to sum arithmetic and geometric progressions.</p>	M1 Identify multiplicative inverses in modular arithmetic.	D1 Produce a detailed written explanation of the importance of prime numbers within the field of computing.
LO2 Analyze events using probability theory and probability distributions	<p>P3 Deduce the conditional probability of different events occurring within independent trials.</p> <p>P4 Identify the expectation of an event occurring from a discrete, random variable.</p>	M2 Calculate probabilities within both binomially distributed and normally distributed random variables.	D2 Evaluate probability theory to an example involving hashing and load balancing.
LO3 Determine solutions of graphical examples using geometry and vector methods	<p>P5 Identify simple shapes using co-ordinate geometry.</p> <p>P6 Determine shape parameters using appropriate vector methods.</p>	M3 Evaluate the coordinate system used in programming a simple output device.	D3 Construct the scaling of simple shapes that are described by vector coordinates.
LO4 Evaluate problems concerning differential and integral calculus	<p>P7 Determine the rate of change within an algebraic function.</p> <p>P8 Use integral calculus to solve practical problems involving area.</p>	M4 Analyse maxima and minima of increasing and decreasing functions using higher order derivatives.	D4 Justify, by further differentiation, that a value is a minimum.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890

STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

Student name:		Assessor name:
Student ID:		Eng. Moath Sulaiman
Is the student repeating this unit? YES NO		
Issue date: 17/8/2021	Submission date: Sep. 3rd 2021 8:00 PM	Submitted on:
Program: Computing		
HTU Course Name: Maths for Computing		BTEC Course Title: Maths for Computing
HTU Course Code: 30202180		BTEC Course Code: D/615/1635
Assignment number and title: Assignment 6: Euclidia SW		

Plagiarism

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalized. It is your responsibility to ensure that you understand **correct referencing practices**. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature:

Date: