

EEE110 Final Exam

Welcome to the final exam of EEE110-Computer Programming and good luck!

Exam Rules:

1. The final exam will be conducted between 09:00 and 10:45. The system will be closed at 10:45.
2. Students are responsible to have a fully-charged laptop computer and 3G internet connection against an interruption in the electricity or internet services. Please note that, allowed number of entries during the exam is determined as 3 due to the internet disconnections.
3. This is a closed-book exam that means students are not allowed to take notes, books, or any other reference material into the exam. Students need to rely entirely on their memory to answer questions.
4. The exam must be taken completely alone. Showing it or discussing it with anybody is forbidden, including (but not limited to) the other students in the course in current or previous years. Absolutely no communication is allowed between or among students.
5. An incorrect answer to a question is awarded no marks with no consideration of any partial credit. Therefore, no partial credit will be given.

Onaylıyorum

Kapat

Başla

EEE110 Final Exam

Yazdır

Tüm Soruları Göster

Önizlemeden Çık

- 1 - **Weight: 10 points out of 80 points**
Recommended Time: 10 minutes

Question

Design a C++ program that fulfills the following criteria:

- The program shall ask for a sentence containing letters, numbers, and whitespaces to the user.
- After the user entry, the program shall remove all of the characters except capital letters.
- Finally, the program shall display the output.

An example of the program's output screen is as follows:

Enter a sentence containing letters, numbers, and whitespaces: 25 11 1917 Alparslan Turkes 31 03 2011 University

Output sentence with only capital letters: ATU

Program ended with exit code: 0

◀ Önceki

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Sonraki ▶

KASIM ZOR (20374117432)

Soruları Otomatik İlerlet

[Sorun Bildir \(/HelpDesk/ReportProblem/E17861AD38AD1189DA58C07E398BF336?examSessionRefId=A0D3EB0DFFAD343970E885F816098759\)](/HelpDesk/ReportProblem/E17861AD38AD1189DA58C07E398BF336?examSessionRefId=A0D3EB0DFFAD343970E885F816098759)

Kalan Süre



EEE110 Final Exam

Yazdır

Tüm Soruları Göster

Önizlemeden Çık

2 - **Weight: 10 points out of 80 points**
Recommended Time: 10 minutes

Question

Develop a C++ program that satisfies the following criteria:

- The program shall open a file which exists in the directory given as '/Users/C++/FinalExam/example.txt' by initially deleting its contents.
- Next, the user shall write a quatrain into that file.
- Finally, the program shall display the typed quatrain from the beginning of the file via employing *fstream*.
- Please note that a sentinel value of -1940 shall be used to terminate the quatrain.

◀ Önceki

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Sonraki ▶

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Kalan Süre



Cevap Listesi

3 - **Weight: 20 points out of 80 points****Recommended Time: 20 minutes****Question**

| Sphere |
|---------------------------------|
| - radius : double |
| + setRadius (r : double) : void |
| + getRadius () : double |
| + getSurfaceArea () : double |
| + getVolume () : double |

According to the UML diagram for the Sphere class indicated above, design a C++ program that performs the following criteria:

- The program shall request radius of the sphere from the user,
- Next, the program shall calculate surface area and volume of the sphere respectively,
- Finally, the program shall display the results of the calculations.

Hint:

- Surface Area of the Sphere is

$$A = 4\pi r^2$$

- Volume of the Sphere is

$$V = \frac{4}{3}\pi r^3$$

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[Sonraki ▶](#)

EEE110 Final Exam

Yazdır

Tüm Soruları Göster

Önizlemeden Çık

4 - **Weight: 25 points out of 80 points**

Recommended Time: 35 minutes

Question

Electrical energy production from wind power is one of the fastest growing technologies and an economically viable option among renewable energy resources. Basically, E_{annual} which corresponds to the annual electrical energy (in Wh) generation from wind power is calculated as follows

$$E_{annual} = 8760C_F P_{wind} c_p$$

where C_F , P_{wind} , and c_p stand for capacity factor, wind power (in W), and power coefficient respectively. Subsequently, P_{wind} can be yielded as

$$P_{wind} = \frac{1}{2} \rho \pi \left(\frac{D}{2}\right)^2 v^3$$

where ρ is the density of air (in kg/m^3), D is the rotor diameter (in m), and v is the average wind speed (in m/s).

According to the aforementioned formulae, design a C++ program that computes annual energy production of a wind turbine by using classes as follows:

- The name of the base class shall be named as *Wind* class, while the derived classes shall be named as *Onshore* and *Offshore* classes which are inherited from the *Wind* class.
- The density of air ρ , the average wind speed v , and the power coefficient c_p shall be declared as global constants and sequentially equals to 1.2 kg/m^3 , 10 m/s , and 0.50 .
- The user shall initially enter the rotor diameter D to calculate P_{wind} in the base class,
- Next, the user shall select either *Onshore* or *Offshore* class to enter the capacity factor C_F ,
- The conditions for the capacity factor C_F

$$0.20 \leq C_F \leq 0.35 \text{ for } \textit{Onshore} \text{ class}$$

$$0.35 \leq C_F \leq 0.50 \text{ for } \textit{Offshore} \text{ class}$$

- The capacity factor C_F shall be validated against erroneous entries by employing
 - *do-while* loops for students with odd student IDs,
 - *while* loops for students with even student IDs.

- 5 - **Weight: 15 points out of 80 points**
Recommended Time: 30 minutes

This question is prepared for the students who could not complete their assignments. If you are glad of your assignment, please do not solve this question, just type 'I hereby declare that my assignment grade will be valid instead of solving this question.'

Question

MOSFET, which stands for Metal-Oxide-Semiconductor Field-Effect Transistor, is the basic building block of modern electronics, and the most frequently manufactured device in history, with an estimated total of 13 sextillion (1.3×10^{22}) MOSFETs manufactured between 1960 and 2018 according to historian David C. Brock.

Regions of a MOSFET with an NMOS logic are classified in the following table

Regions of MOSFET Operation

| | | |
|-------------------|---|---|
| Cut-off Region | $V_{GS} \leq V_{Th}$ | $I_D = 0$ |
| Linear Region | $V_{GS} > V_{Th}$ and $V_{DS} \leq V_{GS} - V_{Th}$ | $I_D = k_n [(V_{GS} - V_{Th})V_{DS} - \frac{(V_{DS})^2}{2}] (1 + \lambda V_{DS})$ |
| Saturation Region | $V_{GS} > V_{Th}$ and $V_{DS} > V_{GS} - V_{Th}$ | $I_D = \frac{k_n}{2} (V_{GS} - V_{Th})^2 (1 + \lambda V_{DS})$ |

where V_{GS} is gate-to-source voltage in V, V_{DS} is drain-to-source voltage in V, V_{Th} is the threshold voltage in V, I_D is drain current in A, k_n is the transconductance parameter of the transistor in A/V^2 , and λ is channel length modulation parameter in V^{-1} respectively.

By using polymorphism in classes according to the aforementioned details of a MOSFET with an NMOS logic, design a C++ program that demands the values of necessary parameters from the user, finds the region wherein the transistor operates, and calculates I_D as well as displaying the name of the region and the value of I_D in A to the screen as outputs.