

Software Workshop – Exercises

17 November 2015

Submissions must be made using Canvas, in the following format.

SUBMISSIONS NOT COMPLYING WITH THESE GUIDELINES WILL HAVE 2 MARKS DEDUCTED.

Uploaded file must be: studentid.zip
in the zip format. Rar or tar.gz will not be accepted.

Archive must contain: Easter.java, EasterComponent.java, EasterGUI.java, EasterModel.java, EasterView.java, SliderListener.java, Test.java

All submissions must be made by midnight Sunday. Submissions after this time **WILL NOT BE MARKED** and will receive **ZERO**.

The date on which Easter Sunday occurs each year depends on a number of factors (e.g. the phases of the moon).

In the Wikipedia article <http://en.wikipedia.org/wiki/Computus> you can find a lot of information about Easter, including several algorithms for computing which day Easter occurs on in any given year.

This week's exercise is based on the **Anonymous Gregorian Algorithm** which you can find in that article.

Remember to javadoc your classes and methods.

Question 1 [4 marks]

Create a class **Easter** with fields for the day, month and year. The constructor should take in the year as an argument and calculate the day and month using the **Anonymous Gregorian Algorithm**. There should be get methods for each field, and a set method for the year that re-calculates the new corresponding date of Easter. Test your program in **Test.java**.

Question 2 [4 marks]

Write a model class **EasterModel** which has an **Easter** object as a field. Write corresponding get methods and a set method for the year (which must notify any observers when a change is made).

Question 3 [4 marks]

Create a class **EasterView** which will be an **Observer**. It should display the date of Easter for any particular year (see picture).

Question 4 [4 marks]

Create a listener class **SliderListener** which will respond to the user moving a slider. It should change the model accordingly.

Question 5 [4 marks]

Write a **EasterComponent** class which extends **JPanel**. It needs to create all the objects for the user interface and make sure they are connected together correctly. It then needs to add all the visual components (see picture).

Question 6 [4 marks]

Write a class **EasterGUI** which contains a **main** method. This should create an **EasterComponent** object and a **JFrame** and put the component on the frame.

Challenge 1

Look up algorithms for calculating the day of the week for any particular date. Implement a program to do this, and a GUI that uses three sliders (one for day, one for month, one for year). Check against a calendar.

https://en.wikipedia.org/wiki/Determination_of_the_day_of_the_week

Challenge 2

Astronomers use a number to represent days called the **Julian Day** – it is the number of days that have passed since the start of the Julian period. Modify your program for challenge 1 to also display the Julian Day corresponding to any particular date.

https://en.wikipedia.org/wiki/Julian_day

Challenge 3

Muslims pray 5 times a day at particular times determined by the sun's position. In addition to the Julian Day, you need to know the latitude, longitude and time zone of your location. Write a program and GUI that calculates the different prayer times:

<http://praytimes.org/calculation/>

