MAT 2170: Laboratory 7

Key Concepts

- Writing and using methods

Instructions

- As usual, create these projects in a `lab7` directory
- Use `Dialog` programs for the first two exercises.
- Come to lab with a **written plan** for each exercise, noting the required inputs, a few test cases, and an algorithm for each. Do **not** come in "cold," expecting to start from scratch and finish the lab.

Exercises

1. (Page 172, Exercise 4) Your program, `numberOfDigits`, is to include and utilize a `countDigits()` method.

2. (Page 175, Exercise 12) Include and utilize an `isPerfect()` predicate method in your program `TestPerfect`. Extend the program to ask the user for a range, `[low, high]`, and find all the perfect numbers in that range (not just between 1 an 9,999).

3. (Bread Machine Instructions) Write a console program to provide instructions to be used to control a bread machine. Allow the user to input the type of bread as 1 for white, 2 for wheat, and 3 for sweet. (See example execution on back of page.) Ask the user if the loaf size is single (1) or double (2), and if the baking is manual (1) or by machine (2). The following table details the time chart for the machine for each bread type. Display a statement for each step. If the user is making a double loaf, increase the baking time by 50 percent. If baking is manual, stop after the loaf-shaping cycle and instruct the user to remove the dough for manual baking. Use methods to display instructions to the user, to ensure they enter a menu choice in the correct range, and to compute the baking time.

   All input values will be integers. You are to write and use several methods, breaking this problem down into smaller problems. Include methods such as `getBreadType()` to prompt for and get the type of bread (or `loafSize`, or `Manual`, or `Answer`), and continue prompting and getting a new value if the one entered isn't one of the choices. Individual methods to display instructions for a particular type of bread, given the `loafSize` and `Manual` values, are expected (`displaySweet(loafSize, Manual)`). Inside each display you'll need to calculate the appropriate amount of time spent on that particular batch of bread, based on the type, `loafSize`, and whether the machine will bake it. A method to *validate* user input, ensuring that it lies in the range needed is also required. The program is to ask the user if they wish to continue using the program and repeat if so.

Time Chart for Bread Machine Functions			
Operation	**White Bread**	**Wheat Bread**	**Sweet Bread**
Primary kneading	15 mins	18 min	20 mins
Primary rising	60 mins	75 min	60 mins
Secondary kneading	18 mins	25 min	33 mins
Secondary rising	20 mins	45 min	30 mins
Loaf shaping	2 seconds	2 seconds	2 seconds
Final rising	75 mins	75 min	75 mins
Baking	45 mins	50 min	35 mins
Cooling	30 mins	30 min	30 mins

An example execution:

```
What type bread are you making: white (1), wheat (2), or sweet (3): 0
Enter your choice between 1 and 3: 4
Not in range, enter choice between 1 and 3: 1
Loaf size?  single = 1, double = 2:  1
Making manually?  manually = 1, by machine = 2: 1

Primary kneading: 15 minutes
Primary rising: 60 minutes
Secondary kneading: 18 minutes
Secondary rising: 20 minutes
Loaf shaping: 2 seconds
You should remove the dough for manual baking.
For a total baking time of 1 hours, 53 minutes, and 2 seconds.

Do you wish to continue?  yes = 1, no = 2: 1

What type bread are you making: white (1), wheat (2), or sweet (3): 3
Loaf size?  single = 1, double = 2:  2
Making manually?  manually = 1, by machine = 2: 2

Primary kneading: 20 minutes
Primary rising: 60 minutes
Secondary kneading: 33 minutes
Secondary rising: 30 minutes
Loaf shaping: 2 seconds
Final rising: 75 minutes
Baking: 52 minutes 30 seconds
Cooling: 30 minutes
For a total baking time of 5 hours, 0 minutes, and 32 seconds.

Do you wish to continue?  yes = 1, no = 2: 1

What type bread are you making: white (1), wheat (2), or sweet (3): 2
Loaf size?  single = 1, double = 2:  2
Making manually?  manually = 1, by machine = 2: 2

Primary kneading: 18 minutes
Primary rising: 75 minutes
Secondary kneading: 25 minutes
Secondary rising: 45 minutes
Loaf shaping: 2 seconds
Final rising: 75 minutes
Baking: 75 minutes
Cooling: 30 minutes
For a total baking time of 5 hours, 43 minutes, and 2 seconds.

Do you wish to continue?  yes = 1, no = 2: 5
Enter your choice between 1 and 2: 0
Not in range, enter choice between 1 and 2: 2
Thank you for using my program!  Enjoy your bread.
```

Finishing Up

Publish each of the programs to your web site, hand in printouts of the programs, and submit an electronic copy of this lab by the beginning of Lab 8.