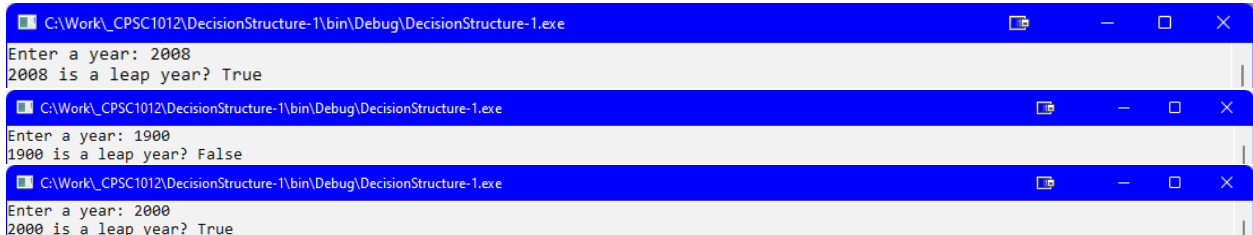


Decision Structure Programming Exercises

1. Write a program that lets the user guess whether the flip of a coin results in heads or tails. The program randomly generates an integer 0 to 1, which represents head or tail. The program prompts the user to enter a guess, and reports whether the guess is correct or incorrect.
2. Write a program to determine if a user input year is a leap year. A year is a leap year if it is divisible by 4 but not by 100, or if it is divisible by 400. Here are some sample runs:



```
C:\Work_CPSC1012\DecisionStructure-1\bin\Debug\DecisionStructure-1.exe
Enter a year: 2008
2008 is a leap year? True

C:\Work_CPSC1012\DecisionStructure-1\bin\Debug\DecisionStructure-1.exe
Enter a year: 1900
1900 is a leap year? False

C:\Work_CPSC1012\DecisionStructure-1\bin\Debug\DecisionStructure-1.exe
Enter a year: 2000
2000 is a leap year? True
```

3. Write a program that plays the scissor-rock-paper game. (A scissor cuts a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number 0, 1, or 2 representing scissor, rock, and paper. The program prompts the user to enter a number 0, 1, or 2 and display a message indicating whether the user or the computer wins, loses, or draws. Here are sample runs:



```
C:\Work_CPSC1012\DecisionStructure-3\bin\Debug\DecisionStructure-3.exe
Scissor (0), Rock (1), Paper (2): 1
The computer is rock. You are too. It is a draw.

C:\Work_CPSC1012\DecisionStructure-3\bin\Debug\DecisionStructure-3.exe
Scissor (0), Rock (1), Paper (2): 1
The computer is paper. You are rock. Computer wins.

C:\Work_CPSC1012\DecisionStructure-3\bin\Debug\DecisionStructure-3.exe
Scissor (0), Rock (1), Paper (2): 1
The computer is scissor. You are rock. You win.
```

4. Write a program that reads in the taxable income of a person and computes the Canadian federal income tax rate and tax amount for a single person. The federal tax rates for 2017 are:
 - 15% on the first \$45,916 of taxable income, +
 - 20.5% on the next \$45,916 of taxable income (on the portion of taxable income over \$45,916 up to \$91,831), +
 - 26% on the next \$50,222 of taxable income (on the portion of taxable income over \$91,831 up to \$142,353), +
 - 29% on the next \$60,477 of taxable income (on the portion of taxable income over \$142,353 up to \$202,800), +
 - 33% of taxable income over \$202,800

The following table contains the formula for computing a single person's tax (Federal tax rates for 2017):

Bracket	Taxable Income	Marginal tax rate	Tax paid
1	<= \$45,916 or less	15%	15%
2	\$45,916 - \$91,831	20.5%	\$6887 + 20.5% of the amount over \$45,916
3	\$91,831 - \$142,353	26%	\$16,300 + 26% of the amount over \$91,831
4	\$142,353 - \$202,800	29%	\$29,436 + 29% of the amount over \$142,353
5	> \$202,800	33%	\$46,965 + 33% of the amount over \$202,800

Here are some sample runs:

```

C:\Work_CPSC1012\DecisionStructure-4\bin\Debug\DecisionStructure-4.exe
Enter your taxable income: 65000
Your federal tax rate is 20.5% an you owe the federal government $10,799.22 in taxes

C:\Work_CPSC1012\DecisionStructure-4\bin\Debug\DecisionStructure-4.exe
Enter your taxable income: 110000
Your federal tax rate is 26.0% an you owe the federal government $21,023.94 in taxes

C:\Work_CPSC1012\DecisionStructure-4\bin\Debug\DecisionStructure-4.exe
Enter your taxable income: 205000
Your federal tax rate is 33.0% an you owe the federal government $47,691.00 in taxes

```

- Write a program that reads the taxable income of an individual and computes the province tax rate and tax amount for an individual in the province of Alberta. The **Alberta** provincial tax rates for 2017 are:

- 10% on the first \$126,625, +
- 12% on the next \$25,325, +
- 13% on the next \$50,650, +
- 14% on the next \$101,300, +
- 15% on the amount over \$303,900

Here is a sample run:

```

C:\Work_CPSC1012\DecisionStructure-5\bin\Debug\DecisionStructure-5.exe
Enter your taxable income: 65000
Your Alberta provincial tax rate is 10.0% and you owe $6,500.00 in taxes!

```

- Write a program to find out the Chinese Zodiac sign for a given year. The Chinese Zodiac is based on a 12-year cycle, with each year represented by an animal: monkey, rooster, dog, pig, rat, ox, tiger, rabbit, dragon, snake, horse, or sheep—in this cycle. Note $year \% 12$ determines the Zodiac sign. 1900 is the year of the rat because $1900 \% 12 = 4$. Here are some sample runs:

```

C:\Work_CPSC1012\DecisionStructure-6\bin\Debug\DecisionStructure-6.exe
Enter a year: 1963
rabbit

C:\Work_CPSC1012\DecisionStructure-6\bin\Debug\DecisionStructure-6.exe
Enter a year: 1889
ox

C:\Work_CPSC1012\DecisionStructure-6\bin\Debug\DecisionStructure-6.exe
Enter a year: 2022
tiger

```

- Write a program that simulates picking a card from a deck of 52 cards. Your program should display the rank (Ace, 2, 3, 4, 5, 6, 7, 8, 9, 10, Jack, Queen, King) and the suit (Clubs, Diamonds, Hearts, Spades) of the card. Here is a sample of the program:

```

C:\Work_CPSC1012\DecisionStructure-7\bin\Debug\DecisionStructure-7.exe
The card you picked is Jack of Diamonds

```