

Homework #1

AI Programming

Due: Sep. 14, 2020

Note: For the following exercises, write a program to solve the problem and display the answer. A possible output is shown in a shaded box and responses to input statements appear underlined.

Exercises 2.2

110. Word Replacement Write a program that requests a sentence, a word in the sentence, and another word and then displays the sentence with the first word replaced by the second. Do not use the format method.

```
Enter a sentence: What you don't know won't hurt you.  
Enter word to replace: know  
Enter replacement word: owe  
What you don't owe won't hurt you.
```

Exercises 2.3

58. Present Value The present value of f dollars at interest rate $r\%$ compounded annually for n years is the amount of money that must be invested now in order to grow to f dollars (called the future value) in n years where the interest rate is $r\%$ per year. The formula for present value is

$$\text{present value} = \frac{f}{\left(1 + \frac{r}{100}\right)^n}$$

Calculate the present value of an investment after the user enters the future value, interest rate, and number of years. The following figure shows that at 4% interest per year, \$7,903.15 must be invested now in order to have \$10,000 after 6 years. The program should use the format method to display the outputs.

```
Enter future value: 10000  
Enter interest rate (as %): 4  
Enter number of years: 6  
Present value: $7,903.15
```

Exercises 3.2

32. Pig Latin Write a program that requests a word (in lowercase letters) as input and translates the word into Pig Latin. The rules for translating a word into Pig Latin are as follows:

- (a) If the word begins with a group of consonants, move them to the end of the word and add *ay*. For instance, *chip* becomes *ipchay*.
- (b) If the word begins with a vowel, add *way* to the end of the word. For instance, *else* becomes *elseway*.

```
Enter word to translate: chip  
The word in Pig Latin is ipchay.
```

Exercises 3.3

- 16. Bouncing Ball** The coefficient of restitution of a ball, a number between 0 and 1, specifies how much energy is conserved when the ball hits a rigid surface. A coefficient of .9, for instance, means a bouncing ball will rise to 90% of its previous height after each bounce. Write a program to input a coefficient of restitution and an initial height in meters, and report how many times a ball bounces when dropped from its initial height before it rises to a height of less than 10 centimeters. Also report the total distance traveled by the ball before this point. The coefficients of restitution of a tennis ball, basketball, super ball, and softball are .7, .75, .9, and .3, respectively.

```
Enter coefficient of restitution: .7
Enter initial height in meters: 8
Number of bounces: 13
Meters traveled: 44.82
```

Exercises 3.4

- 82. Digit Sum** Write a program to calculate the total sum of the digits in the integers from 1 to a million.

```
The sum of the digits in the numbers
from 1 to one million is 27,000,001.
```