

INSTRUCTOR SOLUTIONS MANUAL

**to accompany
An Introduction to Programming
Using Python**

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Answers

CHAPTER 2

EXERCISES 2.1

1. 13.6 2. 49 3. .125 4. 23 5. 2.8 6. -96 7. 2 8. 2
9. 0 10. 3 11. 4 12. 0 13. Valid 14. Not valid
15. Valid 16. Not valid 17. Not valid 18. Not valid 19. 22
20. 50 21. 28 22. 78125 23. 9 24. 8
25. `print((5 * 3)+(3 * 5))` 26. `(3**4)*(4**3)`
27. `print(200 +(1 * 100))` 28. `((2**3)-1)+5`
29. `print(31 * (2 + 28))` 30. `(1/(2**4))*(2**4)`

31.

	x	y
<code>x = -2</code>	-2	does not exist
<code>y = x + 5</code>	-2	3
<code>x = x**y</code>	-8	3
<code>print((x/y)+2)</code>	-8	3
<code>y = y % 2 + 0.6</code>	-8	1.6

32.

	bal	inter	withDr
<code>bal = 100</code>	100	does not exist	does not exist
<code>inter = .05</code>	100	.05	does not exist
<code>withDr = 25</code>	100	.05	25
<code>bal += (inter * bal)</code>	105	.05	25
<code>bal = bal - withDr</code>	80	.05	

33. 75 34. 4 5 2 35. 5 36. 230
37. 3.52 38. 30 255 39. The third line should read `c = a + b`.
40. 1,234 should not contain a comma; \$100 should not have a dollar sign; Deposit should begin with a lowercase letter d.
41. The first line should read `interest = 0.05`. 43. 10 45. 7 47. 3.128
49. -3 50. 2 51. 1 52. 2 53. 6 54. 2
55. `cost += 5` 56. `sum *= 2` 57. `cost /= 6` 58. `sum -= 7`
59. `sum %= 2` 60. `cost //= 3`

- ```

61. revenue = 98456
 costs = 45000
 profit = revenue - costs
 print(profit)

62. costPerShare = 25.625
 numberOfShares = 400
 amount = costPerShare * numberOfShares
 print(amount)

63. price = 19.95
 discountPercent = 30
 markdown = (discountPercent / 100) * price
 price -= markdown
 print(round(price, 2))

64. fixedCosts = 5000
 pricePerUnit = 8
 costPerUnit = 6
 breakEvenPoint = fixedCosts / (pricePerUnit - costPerUnit)
 print(breakEvenPoint)

65. balance = 100
 balance += 0.05 * balance
 balance += 0.05 * balance
 balance += 0.05 * balance
 print(round(balance, 2))

66. balance = 100
 balance = ((1.05) * balance) + 100
 balance = ((1.05) * balance) + 100
 balance *= 1.05
 print(round(balance, 2))

67. balance = 100
 balance *= 1.05 ** 10
 print(round(balance, 2))

68. purchasePrice = 10
 sellingPrice = 15
 percentProfit = 100 * ((sellingPrice - purchasePrice) / purchasePrice)
 print(percentProfit)

69. tonsPerAcre = 18
 acres = 30
 totalTonsProduced = tonsPerAcre * acres
 print(totalTonsProduced)

70. initialVelocity = 50
 initialHeight = 5
 t = 3
 height = (-16 * (t ** 2)) + (initialVelocity * t) + initialHeight
 print(height)

```

- ```

71. averageSpeed = 81.34
    elapsedTime = 9 - 5
    distance = averageSpeed * elapsedTime
    print(distance)

72. miles = 23695 - 23352
    gallonsUsed = 14
    milesPerGallon = miles / gallonsUsed
    print(milesPerGallon)

73. wattsPerMonth = 750000000
    numberOfPeople = 5000000
    numberOfDays = 30
    wattsPerPersonDaily = wattsPerMonth/ (numberOfPeople * numberOfDays)
    print(wattsPerMonth)

74. totalSquareFeet = 432
    lengthOfSide = 432**0.5
    print(lengthOfSide)

75. initialMoney = 1000
    interestRate = .087
    numberOfYears = 2
    totalMoney = initialMoney * (1+ (interestRate**numberOfYears))
    print(round(totalMoney))

76. initialPopulation = 845
    percentIncrease = 0.065
    increaseInPopulation = initialPopulation + (initialPopulation *
    percentIncrease)
    print(round(increaseInPopulation,2))

77. initialAmt = 2.59e+14
    finalAmt = 4.68e+14
    percentGrowth = (finalAmt - initialAmt) * 100 / initialAmt
    print(round(percentGrowth))

78. cubicFeet = (5280 ** 3)
    caloriesPercubicFoot = 48600
    totalNumberOfCalories = cubicFeet * caloriesPercubicFoot
    print(totalNumberOfCalories)

```

EXERCISES 2.2

- | | | | | | |
|-------------------------------|------------------------------|------------|------------|--------------|------------|
| 1. Python | 2. Hello | 3. Ernie | 4. Bert | 5. "o" | 6. "o" |
| 7. "o" | 8. "n" | 9. "Pyt" | 10. [] | 11. "Py" | 12. "Thon" |
| 13. "h" | 14. "ytho" | 15. "th" | 16. "th" | 17. "Python" | 19. 2 |
| 20. -1 | 21. -1 | 23. 7 | 24. 3 | 25. python | 26. True |
| 27. Smallelements | 28. ('hello', '_', 'python') | 29. pYtHoN | | | |
| 30. ['python', 'java', 'c++'] | 31. 8 Ball | 32. 4 | 33. 8 BALL | | |

- 35. Pyt
- 37. "The Artist"
- 39. 5
- 40. "King Lear"
- 41. 7
- 42. 6
- 43. 2
- 45. John's school
- 46. 1
- 47. 12
MUNICIPALITY
City
6
- 48. 9
Microsoft
os
5
- 49. flute
- 50. Acute
- 51. Your age is 21.
- 52. Fred has 2 children.
- 53. A ROSE IS A ROSE IS A ROSE
- 54. PYTHON
- 55. WALLAWALLAWALLA
- 56. murmur
- 57. goodbye
- 58. eighth
- 59. Mmmmmmm.
- 60. ***YES***
- 61. a b
- 62. spamspamspamspam
- 63. 76 trombones
- 64. 5.5
- 65. 8.0
- 66. 8
- 67. 8
- 68. 8
- 69. The Great 9
- 70. The Dynamic Duo
- 71. s[:-1]
- 72. s[2:]
- 73. -8
- 74. 7
- 75. True
- 76. True
- 77. True
- 78. True
- 79. 234-5678 should be surrounded with quotation marks.
- 80. I came to Casablanca for the waters. should be surrounded by quotation marks.
- 81. for is a reserved word and cannot be used as a variable name.
- 82. A string cannot be concatenated with a number. The second line should be written
`print("Age: " + str(age))`
- 83. The string should be replaced with "Say it ain't so."
- 84. Should be written `print('George "Babe" Ruth')`
- 85. UPPER should be changed to upper.
- 86. lower should be changed to lower()
- 87. A string cannot be concatenated with a number. The second line should be written
`print("Age: " + str(age))` or `print("Age:", age)`.
- 88. The characters in a number cannot be indexed.
- 89. find accepts a character as an argument, not a number.
- 90. The len function can not be applied to numbers.
- 91. The str object does not support item assignment.
- 92. show[9] is not valid since the string "Spamalot" does not have a character of index 9.

93. `## Display an inventor's name and year of birth.`
`firstName = "Thomas"`
`middleName = "Alva"`
`lastName = "Edison"`
`yearOfBirth = 1847`
`print("The year of birth of "+firstName, middleName,`
`lastName+" is "+yearOfBirth)`
94. `item = "ketchup"`
`regularPrice = 1.8`
`discount = 0.27`
`print(regularPrice - discount) + " is the sale price of " + item + " ."`
95. `## Display a copyright statement.`
`publisher = "Pearson"`
`print("(c)", publisher)`
96. `prefix = "Fore"`
`print(prefix + "warned is " + prefix + "armed.")`
97. `## Calculate the distance from a storm.`
`prompt = "Enter number of seconds between lightning and thunder: "`
`numberOfSeconds = float(input(prompt))`
`distance = numberOfSeconds / 5`
`distance = round(distance, 2)`
`print("Distance from storm:", distance, "miles.")`

```
Enter number of seconds between lightning and thunder: 1.25
Distance from storm: 0.25 miles.
```

98. `## Calculate training heart rate.`
`age = float(input("Enter your age: "))`
`rhr = int(input("Enter your resting heart rate: "))`
`thr = .7 * (220 - age) + (.3 * rhr)`
`print("Training heart rate:", round(thr), "beats/minute.")`

```
Enter your age: 20
Enter your resting heart rate: 70
Training heart rate: 161 beats/min.
```

99. `## Calculate weight loss during a triathlon.`
`cycling = float(input("Enter number of hours cycling: "))`
`running = float(input("Enter number of hours running: "))`
`swimming = float(input("Enter number of hours swimming: "))`
`pounds = (200 * cycling + 475 * running + 275 * swimming) / 3500`
`pounds = round(pounds, 1)`
`print("Weight loss:", pounds, "pounds")`

```
Enter number of hours cycling: 2
Enter number of hours running: 3
Enter number of hours swimming: 1
Weight loss: 0.6 pounds
```

```

100. ## Calculate cost of electricity.
wattage = int(input("Enter wattage: "))
hoursUsed = float(input("Enter number of hours used: "))
price = float(input("Enter price per kWh in cents: "))
cost = (wattage * hoursUsed) / (1000 * price)
print("Cost of electricity:", '$' + str(round(cost, 2)))

```

```

Enter wattage: 100
Enter number of hours used: 720
Enter price per kWh in cents: 11.76
Cost of electricity: $6.12

```

```

101. ## Calculate percentage of games won by a baseball team.
name = input("Enter name of team: ")
gamesWon = int(input("Enter number of games won: "))
gamesList = int(input("Enter number of games lost: "))
percentageWon = round(100 * (gamesWon) / (gamesWon + gamesList), 1)
print(name, "won", str(percentageWon) + '%', "of their games.")

```

```

Enter name of team: Yankees
Enter number of games won: 68
Enter number of games lost: 52
Yankees won 56.7% of their games.

```

```

102. ## Calculate price/earnings ratio.
earningsPerShare = float(input("Enter earnings per share: "))
pricePerShare = float(input("Enter price per share: "))
PERatio = pricePerShare / earningsPerShare
print("Price-to-Earnings ratio:", PERatio)

```

```

Enter earnings per share: 5.25
Enter price per share: 68.25
Price-to-Earnings ratio: 13.0

```

```

103. ## Determine the speed of a skidding car.
distance = float(input("Enter distance skidded (in feet): "))
speed = (24 * distance) ** .5
speed = round(speed, 2)
print("Estimated speed:", speed, "miles per hour")

```

```

Enter distance skidded: 54
Estimated speed: 36.0 miles per hour

```

```

104. ## Convert a percent to a decimal.
percentage = input("Enter percentage: ")
percent = float(percent[:-1]) / 100
print("Equivalent decimal:", percent)

```

```

Enter percentage: 125%
Equivalent decimal: 1.25

```



```
105. ## Convert speed from kph to mph.
speedInKPH = float(input("Enter speed in KPH: "))
speedInMPH = speedInKPH * .6214
print("Speed in MPH:", round(speedInMPH, 2))
```

```
Enter speed in KPH: 112.6541
Speed in MPH: 70.00
```

Note: The world's fastest animal, the cheetah, can run at the speed of 112.6541 kilometers per hour.

```
106. ## Server's tip.
bill = float(input("Enter amount of bill: "))
percentage = float(input("Enter percentage tip: "))
tip = (bill * percentage) / 100
print("Tip:", '$' + str(round(tip, 2)))
```

```
Enter amount of bill: 21.50
Enter percentage tip: 18
Tip: $3.87
```

```
107. ## Calculate equivalent CD interest rate for municipal bond rate.
taxBracket = float(input("Enter tax bracket (as decimal): "))
bondRate = float(input("Enter municipal bond interest rate (as %): "))
equivCDrate = bondRate / (1 - taxBracket)
print("Equivalent CD interest rate:", str(round(equivCDrate, 3)) + '%')
```

```
Enter tax bracket (as decimal): .37
Enter municipal bond interest rate (as %): 3.26
Equivalent CD interest rate: 5.175%
```

```
108. ## Marketing terms.
purchasePrice = float(input("Enter purchase price: "))
sellingPrice = float(input("Enter selling price: "))
markup = sellingPrice - purchasePrice
percentageMarkup = 100 * (markup / purchasePrice)
profitMargin = 100 * (markup / sellingPrice)
print("Markup:", '$' + str(round(markup, 2)))
print("Percentage markup:", str(round(percentageMarkup, 2)) + '%')
print("Profit margin:", str(round(profitMargin, 2)) + '%')
```

```
Enter purchase price: 215
Enter selling price: 645
Markup: $430.0
Percentage markup: 200.0%
Profit margin: 66.67%
```

```
109. ## Analyze a number.
number = input("Enter number: ")
decimalPoint = number.find('.')
print(decimalPoint, "digits to left of decimal point")
print(len(number) - decimalPoint - 1, "digits to right of decimal point")
```

```
Enter number: 76.543
2 digits to left of decimal point
3 digits to right of decimal point
```

110. ## Word replacement.

```
sentence = input("Enter a sentence: ")
word1 = input("Enter word to
replace: ") word2 = input("Enter
replacement word: ") location =
sentence.find(word1)
newSentence = sentence[:location] + word2 + sentence[location +
len(word1):] print(newSentence)
```

```
Enter a sentence: Live long and
prosper. Enter word to replace:
prosper
Enter replacement word: proper
Live long and proper.
```

111. ## Convert a number of months to years and months.

```
numberOfMonths = int(input("Enter number of
months: ")) years = numberOfMonths // 12
months = numberOfMonths % 12
print(numberOfMonths, "months is", years, "years and", months, "months.")
```

```
Enter number of months: 234
234 months is 19 years and 6
```

112. ## Convert lengths.

```
numberOfInches = int(input("Enter number of inches: "))
feet = numberOfInches // 12
inches = numberOfInches % 12
print(numberOfInches, "inches equals", feet, "feet and", inches,
"inches.")
```

```
Enter number of inches: 185
185 inches is 15 feet and 5 inches.
```

EXERCISES 2.3

- | | | | | |
|-------------------------------|--------------------------------|---|---|---|
| 1. merry
christmas! | 2. Price: \$23.45 | 3. Portion: 90% | 4. Python | |
| 5. 1 x 2 x 3 | 6. tic-tac-toe | 7. father-in-law | 8. father-in-law | |
| 9. What is your name?
John | 10. spam and eggs | 11. Python | 12. on-site repair | |
| 13. Hello World! | 14. Hello
,World! | 15. One
Three | Two
Four | |
| 16. 1
Indiana | 2
Detroit
Lions
Colts | 3
Lions
Colts | 17. NUMBER SQUARE CUBE
2 4 8
3 9 27 | 18. COUNTRY LAND AREA
India 2.5 million sq km
China 9.6 million sq km |
| 19. Hello
Hello | World!
World! | 20. STATE
North Dakota
South Dakota | CAPITAL
Bismarck
Pierre | |
| | | | 21. 01234567890
A B C | |

22. 0123456789012345 23. 01234567890123456 24. 01234567890
 one two three one two three A B C
25. 0123456789 26. 0123456789
 12.30% 1,234
 123.0% 1,234
 1,230.00% 1,234
27. \$1,234.6 28. 1,234 29. 1.2 30. #1,234.00
31. Team Fifa points % fans of World
 Germany 1,725 34.12%
 Argentina 1,538 25.85%
 Columbia 1,450 25.52%
32. Major Percent of Students
 Biology 6.2%
 Psychology 5.4%
 Nursing 4.7%
33. Be yourself - everyone else is taken.
34. Plan first, code later
35. you are the creator of your own destiny.
36. And now for something completely different.
37. The matrix of 3 and 4 has 12 elements.
38. Facebook has 1.3 billion users in the world.
39. The square root of 2 is about 1.4142.
40. Pi is approximately 3.142.
41. In a randomly selected group of 23 people, the probability is 0.51 that 2 people have the same birthday.
42. The population of Canada is 4 people per km square.
43. You miss 100% of the shots you never take. - Wayne Gretsky
44. 12% of the members of the U.S. Senate are from New England.
45. 22.28% of the UN nations are in Europe.
46. The area of Canada is 101.3% of the area of the U.S.
47. abracadabra
48. When you have nothing to say, say nothing.
49. Be kind whenever possible. It is always possible. - Dalai Lama
50. If you can dream it, you can do it. - Walt Disney

51. Yes 52. Yes

```
53. ## Calculate a server's tip.
bill = float(input("Enter amount of bill: "))
percentage = float(input("Enter percentage tip: "))
tip = (bill * percentage) / 100
print("Tip: ${0:.2f}".format(tip))
```

```
Enter amount of bill: 45.50
Enter percentage tip: 20
Tip: $9.10
```

```
54. ## Calculate income.
revenue = eval(input("Enter revenue: "))
expenses = eval(input("Enter expenses: "))
netIncome = revenue - expenses
print("Net income: ${0:,.2f}".format(netIncome))
```

```
Enter revenue: 550000
Enter expenses: 410000
Net income: $140,000.00
```

```
55. ## Calculate a new salary.
beginningSalary = float(input("Enter beginning salary: "))
raisedSalary = 1.1 * beginningSalary
cutSalary = .9 * raisedSalary
percentChange = (cutSalary - beginningSalary) / beginningSalary
print("New salary: ${0:,.2f}".format(cutSalary))
print("Change: {0:.2%}".format(percentChange))
```

```
Enter beginning salary: 42500
New salary: $42,075.00
Change: -1.00%
```

```
56. ## Calculate a change in salary.
beginningSalary = float(input("Enter beginning salary: "))
raisedSalary = 1.05 * 1.05 * 1.05 * beginningSalary
percentChange = (raisedSalary - beginningSalary) / beginningSalary
print("New salary: ${0:,.2f}".format(raisedSalary))
print("Change: {0:.2%}".format(percentChange))
```

```
Enter beginning salary: 35000
New salary: $40,516.88
Change: 15.76%
```

```
57. ## Calculate a future value.
p = float(input("Enter principal: "))
r = float(input("Enter interest rate (as %): "))
n = int(input("Enter number of years: "))
futureValue = p * (1 + (r / 100)) ** n
print("Future value: ${0:,.2f}".format(futureValue))
```

```
Enter principal: 2500
Enter interest rate (as %): 3.5
Enter number of years: 2
Future value: $2,678.06
```