Computing GCSE Coursework

Thomas Bass
Candidate 4869
Centre 52423
OCR A453 Programming Project

Word Count 1730

Made with LaTeX

2016-2017

Summary

1 Objectives **3**
1.1 Task 1 . . . 3
1.2 Task 2 . . . 3
1.3 Task 3 . . . 3

2 Test Plan **4**
2.1 Task 1 . . . 4
2.2 Task 2 . . . 4
2.3 Task 3 . . . 4

3 Pseudocode **6**
3.1 Task 1 . . . 6
3.2 Task 2 . . . 7
3.3 Task 3 . . . 7

4 Data Structure **8**
4.1 Task 1 . . . 8
4.2 Task 2 . . . 8
4.3 Task 3 . . . 8

5 Development **9**
5.1 Task 1 . . . 9
5.2 Task 2 . . . 12
5.3 Task 3 . . . 15

6 Testing **16**
6.1 Task 1 . . . 16
6.2 Task 2 . . . 17
6.3 Task 3 . . . 19

7 Final Program Code **20**
7.1 Task 1 . . . 20
7.2 Task 2 . . . 21
7.3 Task 3 . . . 22

1 Objectives

1.1 Task 1

1. Take an input and verify that it is 8 or 7 numerical digits
2. Calculate the 8th check digit:

a Multiply the first 7 numbers alternately by 3,1

b Total these results

c Subtract this sum from its nearest highest multiple of 10

3. Compare this to the given 8th number, or complete the 7-digit number

1.2 Task 2

1. Take an input and validate that it is 8 numerical digits
2. Connect to a SQL database and run a query
3. Collect and display the results
4. Update the database with the customer?s order
5. Print a receipt
6. Cope with SQL errors

1.3 Task 3

1. Scan a database and find stock to order
2. Create a receipt of the order
3. Update the database with the updated stock level
4. Cope with any SQL errors

2 Test Plan

2.1 Task 1

Test Number	Test Name	Test Data	Test Type
1	Input strings of incorrect length. If rejected, it passes	`12345`	Error
2	Input strings of incorrect length. If rejected, it passes	`1234567890`	Error
3	Input strings of letters. If rejected, it passes.	`abcdefg`	Error
4	Run a valid input. Print out totals at each stage, and manually check. If the calculations are correct, it passes.	`13245627`	Normal
5	Run the program with a GTIN number taken from a product. If it correctly calculated and verified, it passes.	`01412871`	Error

2.2 Task 2

Test Number	Test Name	Test Data	Test Type
1	Input strings of incorrect length. If rejected, it passes	`12345`	Error
2	Input strings of incorrect length. If rejected, it passes	`1234567890`	Error
3	Input strings of letters. If rejected, it passes.	`abcdefg`	Error
4	Input a valid string to search. If product found, it passes	`11440529`	Normal
5	Manually check that the program has displayed the correct stock level and information. If it does, it passes.	Stock info: 50 in stock for `#11440529` (red paint 100ml)	Normal
6	Order a quantity of the product. If the program updates the stock levels, it passes.	Order 5 x QTY of `#11440529` (red paint 100ml).	Normal
7	Complete a full order. If the program displays a receipt with the correct values, it passes. Expected total: £21.90 .	Test data: order 5 x QTY of `#11440529` (red paint 100ml) AND 6 x QTY of `#11509493` (blue paint 100ml).	Normal
8	Provide the program with a negative. If the program rejects this, it passes	-3 x QTY `#11509493`	Extreme
9	Provide the program with zero. If the program rejects this, it passes	0 x QTY `#11509493`	Error
10	Provide the program with more stock that available. If the program rejects this, it passes	100 x QTY `#11509493`	Extreme

2.3 Task 3

1. Edit database for reduced stock. If reduced stock is identified, it passes.

   Test data: Edit a stock level to -10 of stock level.

   Print receipt.

2. Edit database for reduced stock. If a human-readable receipt is produced, it passes.

   Test data: Edit two stock levels to -10 of stock level.

Print receipt.

3. Complete order for reduced stock. If the database updated, it passes.

   Continue from test area 2, and update database.

   Check database manually.

4. If the program handles SQL errors, it passes.

   Attempt to update from more than stock level.

3 Pseudocode

3.1 Task 1

```
START
User INPUT choice for calculate or verify
IF Calculate:
Number Length is 7
  INPUT GTIN
  CALL Verify function
ELSE IF Verify:
  Number Length is 8
  INPUT GTIN
  CALL verify Function
ENDIF
ENDIF
Verify Function:
  IF GTIN length = Length AND is all numeric:
    For a loop of 7 by step of 2:
      total = total+(GTIN [counter]*3)
      IF counter =6:
        Round total UP to nearest multiple of 10
        result = roundedNumber - total
          If Length = 7:
            Print result
            ASK User to repeat
          ELSE
            If GTIN at position Length = result:
              Print GTIN is a valid number
              ASK User to repeat
            ELSE:
              Print GTIN is an invalid number
              ASK User to repeat
            ENDIF
      ELSE
        Multiply GTIN at position of counter+1 by 1 and add to total
      ENDIF
  ELSE
    Print error and return to GTIN input
  ENDIF
END
```

3.2 Task 2

```
START
User INPUT GTIN number
IF GTIN is numerical AND GTIN = 8 charachters:
  Search Database for GTIN number
  IF result found:
    User INPUT quantity to order
    IF quantity > 0 AND quantity <= stock available
      PRINT receipt with total cost (cost per item * quantity ordered)
      Update Database with new stock (stock available a quantity ordered)
      User INPUT choice to order more items
      IF choice = yes:
        Add to order list and return to GTIN INPUT
      ELSE
        PRINT final receipt (order list) and end program
      ENDIF
    ELSE
      Return to Quantity INPUT
    ENDIF
  ELSE
    Return to GTIN INPUT
  ENDIF
ELSE
  Return to GTIN INPUT
ENDIF
END
```

3.3 Task 3

```
START
Connect to SQL Database
Search database:
  IF stock level < target stock level:
  RETURN results
PRINT results
APPEND results to order list
IF order complete:
  UPDATE database:
  stock level = target stock level
ELSE
  END
ENDIF
END
```

4 Data Structure

4.1 Task 1

Variable Name	Variable Description
`ask`	The choice wether the user wants to verify or calculate
`gtin`	The GTIN number used
`length`	The length the GTIN should be
`total`	The running total of all the multiplications
`checkdig`	The 8th digit in a verification
`rounded`	`total` Rounded up to the nearest 10
`result`	The 8th digit as the program calculates it
`again`	The choice of wether the user wants to run the program again

4.2 Task 2

Variable Name	Variable Description	Value
`con` and `cur`	Connections to SQL database	N/A
`var`	User Input GTIN number	User Defined
`results`	Fetchall results from SQL query	N/A (list)
`product`	Equal to `results`, reformatted	Equal to `results`
`sizeName` and `sizeNameRaw`	Variables used to format the name of the product	Name of product selected
`QtyToOrder`	User Input quantity ordered	User Defined
`NewStockAvab`	Variable used to update the SQL database with the new stock levels	Stock Available minus `QtyToOrder`
`costOfOrder`	Total cost of order	Price of product*`QtyToOrder`
`currentOrderAddRaw` and `currentOrderAdd` and `currentOrder`	Variables used to format and append the order to the entire list of order (to print receipt)	N/A

4.3 Task 3

Variable Name	Variable Description	Value
`con` and `cur`	Connections to SQL database	N/A
`sql1`	SQL command for finding reduced stock levels	`SELECT* FROM Inventory WHERE StockAvab != Target Stock`
`results`	Fetchall results from SQL query	N/A, List
`toOrder`	Value of how much stock needs to be ordered for each product	`targetStock - stockAvab`
`sizeName` and `sizeNameRaw`	Used to correctly format the product name	N/A
`stockOrderAddRaw` and `stockOrderAdd` and `stockOrder`	Used to format the list of the stock update order	N/A
`orderList`	Final order list	N/A

5 Development

5.1 Task 1

For all my development, the code was written in Python's IDLE, an integrated development environment which comes packaged with Python installs.

Objective 1: Take an input and verify that it is 8 or 7 numerical digits

`start()` **Function**

```
print('GCSE Controlled Assesment A453\nThomas Bass 4869\nTask 1')
def start():
  ask = input('Press [c] to calculate the 8th digit from 7 \nPress [v] to vertify an 8 digit GTIN Number \n')
  if ask == 'c' or == 'C':
    length == 7
  elif ask == 'v' or == 'V':
    length == 8
  else:
    print('Error: Please enter either \'c\' or \'v\' ')
    start()
  check(length)
```

This function takes a user input of 'ask' to decide if the user wants to either calculate the 8th GTIN digit from 7 digits (choice `c`), or verify the 8th GTIN digit from 8 digits (choice `v`). If the choice is `c`, the program creates the variables `gtin` and `length`, and sets `length` to 7. It then calls the `check()` function carrying `length` with it.

If the choice is `v`, the program creates the variables `gtin` and `length`, and sets `length` to 8. It then calls the `check()` function carrying `length` with it.

The first revision produced syntax errors on line 4 and 6. This is because the variable has to be re-stated after an `or` condition. After this was corrected, the IDLE gave the following error:

```
Traceback (most recent call last):
  File "/Users/ThomasBass/GitHub/GSCE-Coursework-Python-GTIN/Task 1/FINAL/Task 1.py", line 44, in <module>
    start()
  File "/Users/ThomasBass/GitHub/GSCE-Coursework-Python-GTIN/Task 1/FINAL/Task 1.py", line 7, in start
    length == 7
NameError: name 'length' is not defined
```

This error was produced as the incorrect operators were used in lines 5 and 7. The IDLE interpreted the code to compare `length` to the number 7 (line 5) or 8 (line 7). These were then corrected to `length = 7` and `length = 8` respectively. The program then gave the following output:

```
 RESTART: /Users/ThomasBass/GitHub/GSCE-Coursework-Python-GTIN/Task 1/FINAL/Task 1.py
GCSE Controlled Assesment A453
Thomas Bass 4869
Task 1
Press [c] to calculate the 8th digit from 7
Press [v] to vertify an 8 digit GTIN Number
c
```

From the following code:

```
def start():      ## Main process
 ask = input('Press [c] to calculate the 8th GTIN Number from 7 numbers. \nPress [v] to vertify an 8 digit GTIN
 if ask == 'c' or ask == 'C':
   gtin = 0
   length = 7
   check(length)
 elif ask == 'v' or ask == 'V':
   gtin = 0
   length = 8
   check(length)
 else: print('Error: Please enter either \'c\' or \'v\' ')
 start()
```

This shows that the `start()` function is working correctly

`check()` Function

```
def check(length):
  print('Enter the', length, 'digit GTIN number')
  gtin = input(': ')
  if len(gtin) == length
    total = 0
  else:
    print('Error: Only', length, 'numbers are allowed. Try again ')
```

This function prints a statement asking the user for the `length` length GTIN. It then takes the user input of `gtin`.

If the length of `gtin` is equal to `length` and `gtin.isnumeric` function is True (the variable is numerical) then it creates the variable `total`. Else, it prints an error message, and returns to the `check()` function.

The first revision gave a syntax error on line 4, as there was a missing colon. This was added, and the second revision ran, and rejected incorrect lengths, but allowed correct lengths including letters. The `math` Python library provides the `isnumeric` function that gives boolean `False` if the variable carried contains characters other than numerical. This was used as `if gtin.isnumeric() == True`. The program then gave the following output:

```
Enter the 7 digit GTIN number
: abcdef
Error: Only 7 numbers are allowed. Try again
```

The program worked and rejected invalid strings, but if the user had entered an invalid input, the program would reject it, but terminate the program. The code was then added after line 7 to call `check(length)` after an invalid input. `length` is carried so that the program does not have to re-start. The program then ran the following output:

```
Enter the 7 digit GTIN number
: abcdef
Error: Only 7 numbers are allowed. Try again
Enter the 7 digit GTIN number
:
```

With the following code:

```
def check(length):
  print('Enter the', length, 'digit GTIN number')
  gtin = input(': ')
  if len(gtin) == length and gtin.isnumeric() == True:
    total = 0
else:
  print('Error: Only', length, 'numbers are allowed. Try again ')
  check(length)
```

This shows that the program is correctly calling `check(length)`, and is working correctly.

Objective 2: Calculate the 8th check digit

Multiply the first 7 numbers alternately by 3,1

```
for counter in range(0, 7, 2):
  total = total + ((int(gtin[counter]))*3)
  total = total + ((int(gtin[counter+1]))*1)
```

This snippet starts a loop for the value of `counter`, which goes from 0 to 7, stepping by 2 each time. The counter could have gone 0 to 3 stepping by 1, but this would make it more complicated. The program then adds the following to `total` : integer of: `gtin` at position of `counter` multiplied by 3. It then adds to following to `total` : integer of `gtin` at position of `counter+1` multiplied by 1.

Total these results

The program simply adds all of these calculations to `total`

Subtract this sum from its nearest highest multiple of 10

```
if counter == 6:
  checkdig = int(gtin[length-1])
  rounded = (int(math.ceil(total / 10.0)) * 10)
  result = (rounded - total)
```

This snippet checks to see if the loop is on its final iteration (`counter` = 6). It then sets `checkdig` to the penultimate digit of `gtin`. It then creates the variable `rounded` and sets it to to the nearest highest multiple of 10 of `total`. It then creates the variable `result` and sets it to the result of `rounded` - `total`.

Objective 3: Compare this to the given 8th number, or complete the 7-digit number

```
if length == 7:
  print('Final Check Digit = ', result)
  print('Whole GTIN-8 Number = ', gtin,result)
  park()
else:
  if checkdig == result: print(gtin, 'is a Valid Number')
  else: print(gtin, 'is an Invalid Number')
  park()
```

In this section of code, if `length` equals 7, the program prints the final check digit (`result`), and also prints the whole calculated GTIN (`gtin` and `result`). It then calls the `park()` function Else, if `checkdig` is equal to `result`, it prints that `gtin` is a valid number. Else, it prints that `gtin` is an invalid number.

`park()` Function

The `park()` function is used after a verification or calculation has been made, and allows the user to carry out more verifications or calculations without restarting the program.

```
def park():
  again = input('Do you want to calculate or verify another number? \n[n] No [y] Yes: ')
  if again == 'n' or again == 'N':
    sys.exit()
  elif again == 'y' or again == 'Y':
    start()
```

This program asks the user if they want to restart the program. If yet, it calls `start()` function, and if no it ends the program. The `sys` Python library provides the `.exit()` function to terminate the program. In IDLE it simply ends it, but when compiled into command line it will close the window.

5.2 Task 2

Objective 1: Take an input and validate that it is 8 numerical digits

```
def verify(con, cur, currentOrder):
  var = input('Enter GTIN for the product you wish to purchase:\n> ')
  if len(var) == 8 and var.isnumeric() == True:
    findStock(con, cur, currentOrder, var)
  else:
    print('Enter a 8 digit number')
    verify(con, cur, currentOrder)
```

This function takes the user input `var`. If it is 8 digits long and `var.isnumeric` function is True (the variable is numerical) , it calls findStock function, carrying `con` and `cur` (variables for SQL database connection), `currentOrder`, and `var`. Else, it prints an error message and returns to `verify()` function.

Objective 2: Connect to a SQL database and run a query

```
con = lite.connect('dbuse.db')
cur = con.cursor()
```

This snippet uses the sqlite3 library to connect to the database file `dbuse.db`.

```
def findStock(con, cur, currentOrder, var):
  cur.execute('SELECT * FROM Inventory WHERE GTIN = ?', (var,))
  results = cur.fetchall()          ## collects results from SQL
  con.commit()
```

The `findStock()` function executes the SQL query to find the record in `Inventory` where GTIN is equal to `var`. It then sets the variable `results` to the results of this query.

Objective 3: Collect and display the results

```
for product in results:
  if product[2] == '':
    sizeName = ''
  elif product[2] == 'Small' or product[2] == 'Medium' or product[2] == 'Large':
    sizeName = product[2]
  else:
    sizeNameRaw = product[2], 'ml'
    sizeName = "".join(sizeNameRaw)
  print('  Name: ', sizeName, product[1], '\n  Price: ', product[3], '\n  Stock Available: ', product[4])
```

This section of code formats the product name: If the product has no size, it displays the name. If it has a small/medium/large quantity, it appends that to the end. If it has a ml volume, it appends that to the front. It then prints the name of the product as product name, volume, price, stock available.

Objective 4: Update the database with the customer's order

```
def enterOrder(sizeName, product, var, results, currentOrder, cur, con):
  QtyToOrder = input('----------\nEnter Quantity to order:\n>')
  if QtyToOrder.isnumeric() == False:
    print('Enter a valid Number')
    enterOrder(sizeName, product, var, results, currentOrder, cur, con)
  elif int(QtyToOrder) > int(product[4]):
    print('Error: Not enough stock. Please order', product[4], 'or less')
    enterOrder(sizeName, product, var, results, currentOrder, con, cur)
  elif int(QtyToOrder) < 1:
    print('You can\'t order less than 1. Try again')
    enterOrder(sizeName, product, var, results, currentOrder, con, cur)
```

This section of `enterOrder()` function ensures that the customer can only order more than 1, and less than or equal the number of stock available.

```
else:
    print('Adding to order...')
    NewStockAvab = 0
    costOfOrder = float(product[3])*int(QtyToOrder)
    currentOrderAddRaw = str(QtyToOrder), ' x ', str(sizeName), ' ', str(product[1]), ' (GTIN: ', str(product[0]), ') @ £',
    str(product[3]), ' = £', str(costOfOrder)
    currentOrderAdd = "".join(currentOrderAddRaw)
    print('Added to order!')
    print('Updating Stock Levels...')
    QtyInt = int(QtyToOrder)
    NewStockAvab = str((int(product[4])) - QtyInt)
    sql = ("UPDATE INVENTORY SET STOCKAVAB = '"+NewStockAvab+"' WHERE GTIN LIKE '"+product[0]+"'")
```

This section creates a verbose receipt, and makes an SQL query to update the database with the new stock levels.

When this was tested, it produced this output:

```
Receipt:
40 x 100ml Red Paint (GTIN: 11440529) @ £
```

The calculation for the final cost was broken as Python can not read over a line break. The line break in line 5 and 6 was stopping the full calculation. This was fixed:

```
else:
    print('Adding to order...')
    NewStockAvab = 0
    costOfOrder = float(product[3])*int(QtyToOrder)
    currentOrderAddRaw = str(QtyToOrder), ' x ', str(sizeName), ' ', str(product[1]), ' (GTIN: ', str(product[0]), ') @ £', str(product[3]), ' = £', str(costOfOrder)
    currentOrderAdd = "".join(currentOrderAddRaw)
    print('Added to order!')
    print('Updating Stock Levels...')
    QtyInt = int(QtyToOrder)
    NewStockAvab = str((int(product[4])) - QtyInt)
    sql = ("UPDATE INVENTORY SET STOCKAVAB = '"+NewStockAvab+"' WHERE GTIN LIKE '"+product[0]+"'")
```

The program was then tested to give the following correct output:

```
Order another item? [Y/N]:
>n
Order finished!
Receipt:
50 x 100ml Red Paint (GTIN: 11440529) @ £1.99 = £99.5
```

Objective 5: Print a receipt

```
currentOrder.append(currentOrderAdd)
again = input('Order another item? [Y/N]:\n>')
if again == 'Y' or again == 'y':
  verify(con, cur, currentOrder)
if again == 'N' or again == 'n':
  print('Order finished!')
  print('Receipt:')
  for order in currentOrder:
    print(order)
```

Objective 6: Cope with SQL errors

```
except:
  print('Error: Inventory Update failed to commit.')
  currentOrder.append(currentOrderAdd+' [CANCELLED]')
  print('\n\nPLEASE ENTER \'100\' TO ESCAPE ERROR\n\n')
  enterOrder(sizeName, product, var, results, currentOrder, cur, con)
```

If the user enters an invalid number, the `sqlite3` library may get confused, and may enter an error loop. To break this loop, the user has to force the library to send another invalid request to the database.

5.3 Task 3

Objective 1: Scan a database and find stock to order

```
def findStock(con, cur, stockOrder):
  slq1 = 'SELECT * FROM Inventory WHERE StockAvab != TargetStock'
  cur.execute(slq1)
  results = cur.fetchall()
  orderList = []
```

The `findStock()` function sends a SQL query to the database to find any record where the stock level does not equal the target stock level. It then sets the variable `results` to these results.

Objective 2: Create a receipt of the order

```
print('Low stock! Order', toOrder, 'x', product[1], 'more to fill stock')
if product[2] == '':
  sizeName = ''
elif product[2] == 'Small' or product[2] == 'Medium' or product[2] == 'Large':
  sizeName = product[2]
else:
  sizeNameRaw = product[2], 'ml'
  sizeName = "".join(sizeNameRaw)
stockOrderAddRaw = str(toOrder), ' x ', str(sizeName), ' ', str(product[1]), ' (GTIN: ', str(product[0]), ')'
stockOrderAdd = "".join(stockOrderAddRaw)
stockOrder.append(stockOrderAdd)
orderList.append(product[0])
```

This section is similar to Task 2 Objective 4, and formats a verbose name of the product, and adds it to the receipt list.

Objective 3: Update the database with the updated stock level

```
def updateStock(con, cur, stockOrder, toOrder, orderList):
  ##print(orderList)
  print('Updating Database...')
  for productUpdate in orderList:
    sql2 = "UPDATE INVENTORY SET STOCKAVAB = TARGETSTOCK WHERE GTIN LIKE '"+productUpdate+"'"
    try:
      cur.execute(sql2)
      con.commit()
      print('Complete #', productUpdate)
    except:
      print('An exception occured.')
```

This function connects to the SQL database and updates the new stock levels. If it fails, it returns to the last function.

Objective 4: Cope with any SQL errors

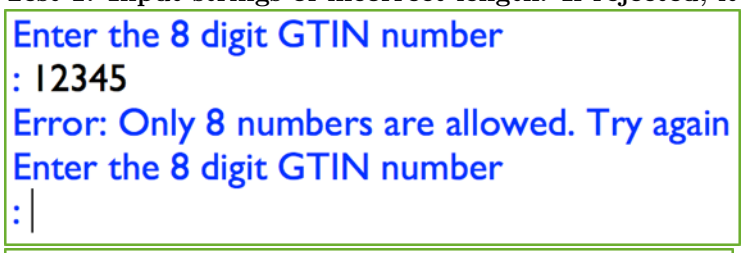
```
except:
  print('An exception occured.')
  findStock(con, cur, stockOrder)
```

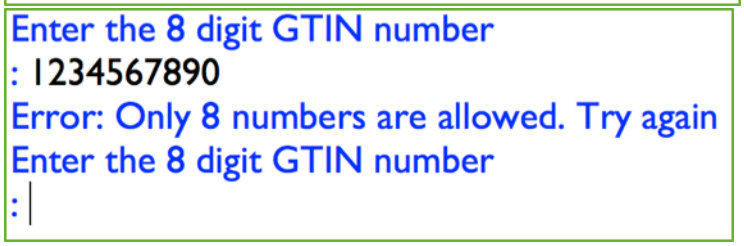
There should not be any SQL errors, as the user does not input any information that is used directly in the SQL query. This also protects against SQL injection.

6 Testing

6.1 Task 1

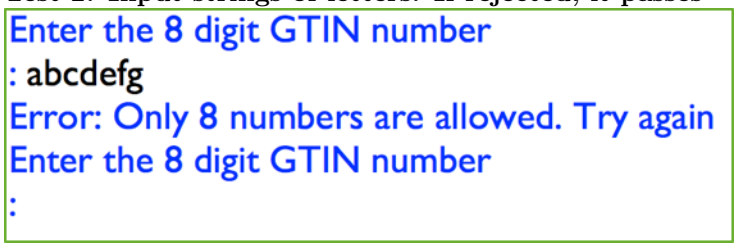
Test 1: Input strings of incorrect length. If rejected, it passes





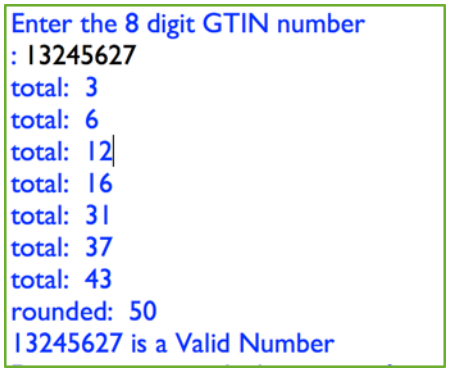
These show that the length verification is working.

Test 2: Input strings of letters. If rejected, it passes



This shows that the numerical verification is working

Test 3: Get program to run a valid input. Print out totals at each stage, and check them manually. If they are the same, it passes



1*3 = 3
3+3*1=6
6+2*3=12
12+4*1=16
16+5*3=31
31+6*1=37
37+2*3=43
Highest 10 of 43 = 50
50-43 = 7
Checkdig = 7

Test 4: Run the program with a GTIN number taken from a product. If it correctly calculated and verified, it passes


```
Enter the 8 digit GTIN number
:01412871
01412871 is a Valid Number
```

This shows that my program works in a real world situation, and can easily verify or calculate real GTIN codes.

6.2 Task 2

Test 1: Input strings of incorrect length. If rejected, it passes

```
Enter GTIN for the product you wish to purchase:
> 12345
Enter a 8 digit number
Enter GTIN for the product you wish to purchase:
>
```

```
Enter GTIN for the product you wish to purchase:
> 1234567890
Enter a 8 digit number
Enter GTIN for the product you wish to purchase:
>
```

From these, you can see that my length verification is working.

Test 2: Input strings of letters. If rejected, it passes

```
> abcdefg
Enter a 8 digit number
Enter GTIN for the product you wish to purchase:
>
```

From this, you can see that my numerical verification is working.

Test 3: Input a valid string to search. If product found, it passes

```
Enter GTIN for the product you wish to purchase:
> 11440529
Product Found!
  Name:  100ml Red Paint
  Price:  1.99
  Stock Available:  50
----------
Enter Quantity to order:
>
```

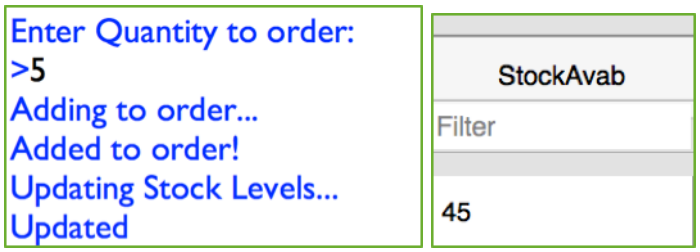
The program successfully located a valid product

Test 4: Manually check that the program has displayed the correct stock level and information. If it has, it passes.

	GTIN	ProductName	Size	Price	StockAvab	TargetStock
	Filter	Filter	Filter	Filter	Filter	Filter
1	11440529	Red Paint	100	1.99	50	50

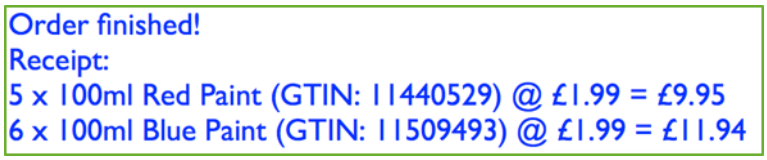
The program has displayed the correct information for product `#11440529`

Test 5: Order a quantity of the product. If the program updates the stock levels, it passes.



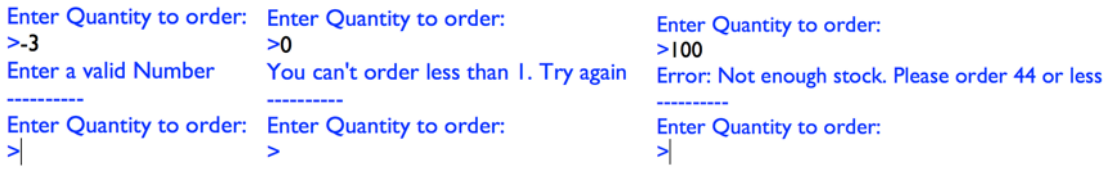
The program successfully ordered 5 of `#11440529` and updated the database

Test 6: Complete a full order. If the program displays a receipt with the correct values, it passes



The program successfully ordered the products, printed a receipt, and calculated the correct cost.

Test 7: Provide the program with invalid values (such as ordering negative values). If the program rejects these, it passes.



This shows that the program rejects negative and 0 quantities, as well as quantities above the stock level.

6.3 Task 3

Test 1: Edit database for reduced stock. If reduced stock is identified, it passes

	GTIN	ProductName	Size	Price	StockAvab	TargetStock
	Filter	Filter	Filter	Filter	Filter	Filter
1	11440529	Red Paint	100	1.99	45	50

```
Low stock! Order 5 x Red Paint more to fill stock
    Added to order form
```

This shows that the program can correctly identify a reduced stock

Test 2: Edit database for reduced stock. If a human-readable receipt is produced, it passes

1	11440529	Red Paint	100	1.99	45	50
2	11509493	Blue Paint	100	1.99	45	50

```
Low stock! Order 5 x Red Paint more to fill stock
    Added to order form
Low stock! Order 5 x Blue Paint more to fill stock
    Added to order form

~~~~~~~~~Stock Order Form~~~~~~~~~
5 x 100ml Red Paint (GTIN: 11440529)
5 x 100ml Blue Paint (GTIN: 11509493)
Is the order complete? [Y/N]
>
```

This shows that the program can correctly identify two reduced stock levels, and append them to a verbose receipt

Test 3: Complete order for reduced stock. If the database updated, it passes.

```
Is the order complete? [Y/N]
>y
Updating Database...
Complete # 11440529
Complete # 11509493
```

StockAvab
Filter
50
50

This shows that the program can update the database with the new stock level

Test 4: If the program handles SQL errors, it passes

StockAvab
Filter
50
50

The program does not allow the user to order any stock if all stock levels are up to date

7 Final Program Code

7.1 Task 1

```
import math
import sys
print('GCSE Controlled Assesment A453\nThomas Bass 4869\nTask 1')
def start():
  ask = input('Press [c] to calculate the 8th digit from 7\n
  'Press [v] to vertify an 8 digit GTIN Number \n')
  if ask == 'c' or ask == 'C':
    length = 7
  elif ask == 'v' or ask == 'V':
    length = 8
  else:
    print('Error: Please enter either \'c\' or \'v\' ')
    start()
  check(length)
def check(length):
  print('Enter the', length, 'digit GTIN number')
  gtin = input(': ')
  if len(gtin) == length and gtin.isnumeric() == True:
    total = 0
    for counter in range(0, 7, 2):
      total = total + ((int(gtin[counter]))*3)
      if counter == 6:
        checkdig = int(gtin[length-1])
        rounded = (int(math.ceil(total / 10.0)) * 10)
        result = (rounded - total)
        if length == 7:
          print('Final Check Digit = ', result)
          print('Whole GTIN-8 Number = ', gtin,result)
          park()
        else:
          if checkdig == result: print(gtin, 'is a Valid Number')
          else: print(gtin, 'is an Invalid Number')
          park()
      else:
        total = total + ((int(gtin[counter+1]))*1)
  else:
    print('Error: Only', length, 'numbers are allowed. Try again ')
    check(length)
def park():
  again = input('Do you want to calculate or verify another number?'
  '\n[n] No [y] Yes: ')
  if again == 'n' or again == 'N':
    sys.exit()
  elif again == 'y' or again == 'Y':
    start()
start()
```

```
## Imports Math and Sys librarys


## Defines 'start'

## Ask the user if they want to verify or calculate
## If user chooses to calculate
## 'length' is 7
## If user chooses to verify
## 'length' is 8
## else
## Error message
## Return to 'start'
## Call 'check' function
## Define 'check' function
## Ask the user to input the GTIN
## Input 'gtin'
## If the length of 'gtin' is equal to 'length' and 'gtin' is numeric
## 'total' is 0
## For 7 iterations, stepping 'counter' by 2
## 'total' is 'total' plus 'gtin' position 'counter' times 3
## If 'counter' is 6
## 'checkdig' is 'gtin' position 'length' -1
## 'rounded' is ceil of 'total' /10.0 * 10 (rounded up to multiple of 10)
## 'result' is 'rounded' - 'total'
## If 'length' is 7
## Print 'result'
## Print 'gtin'+'result'
## Call 'park' function
## Else
## If 'checkdig' equals 'result': GTIN is valid
## Else: GTIN is invalid
## Call 'park' function
## Else
## 'total' is 'total' plus 'gtin' position 'counter'
## Else
## Print error message
## Call 'check' function
## Define 'park' function

## Ask the user to go again
## If No:
## Close program
## If Yes:
## Call 'start' function
## Call 'start' function
```

7.2 Task 2

```
__authors__ = ['Thomas Bass']
##   Candidate Number 4869  |  Centre Number 52423
##   TASK 2
import sqlite3 as lite                                                  ## Imports libraries
import random
import math
currentOrder = []                                                       ## Define currentOrder as an array
con = lite.connect('dbuse.db')                                          ## connects to Database
cur = con.cursor()                                                      ## SQLite
def verify(con, cur, currentOrder):                                     ## Define verify
  var = input('Enter GTIN for the product you wish to purchase:\n> ')   ## input 'var'
  if len(var) == 8 and var.isnumeric() == True:                         ## If 'var' = 8 and is numerical
    findStock(con, cur, currentOrder, var)                              ## Call findStock
else:                                                                   ## Else
    print('Enter a 8 digit number')                                     ## Print error
    verify(con, cur, currentOrder)                                      ## call verify

def findStock(con, cur, currentOrder, var):                             ## Define findStock
  cur.execute('SELECT * FROM Inventory WHERE GTIN = ?', (var,))         ## excutes
  results = cur.fetchall()                                              ## collects results from SQL
  con.commit()                                                          ## Commit .db-journal
  if results == []:                                                     ## If resutls array is empty
    print('No product found. Please try again')                        ## Print no results found
    verify(con, cur, currentOrder)                                      ## Call verify
  print('Product Found!')                                               ## Print product Found
  for product in results:                                               ## Loop for products in resutls
    if product[2] == '':                                                ## If Product [2] is empty
      sizeName = ''                                                     ## Product [2] is empty
    elif product[2] == 'Small' or product[2] == 'Medium' or product[2] == 'Large':
      sizeName = product[2]                                             ## If Product [2] is small/medimm/large sizeName = product[2]
    else:
      sizeNameRaw = product[2], 'ml'                                    ## sizeNameRaw = product[2]
      sizeName = "".join(sizeNameRaw)                                   ## sizeName = sizeNameRaw join''
    print('  Name: ', sizeName, product[1], '\n  Price: ', product[3],'
    '\n  Stock Available: ', product[4])
    enterOrder(sizeName, product, var, results, currentOrder, cur, con)         ## Call enterOrder

def enterOrder(sizeName, product, var, results, currentOrder, cur, con):        ## Define enterOrder
  QtyToOrder = input('----------\nEnter Quantity to order:\n>')                 ## Input QtyToOrder
  if QtyToOrder.isnumeric() == False:                                           ## If QtyToOrder is not numerical
    print('Enter a valid Number')                                               ## Error
    enterOrder(sizeName, product, var, results, currentOrder, cur, con)         ## Call enterOrder
elif int(QtyToOrder) > int(product[4]):                                         ## Elif QtyToOrder > product[4]
    print('Error: Not enough stock. Please order', product[4], 'or less')       ## Print
    enterOrder(sizeName, product, var, results, currentOrder, con, cur)         ## Call enterOrder
elif int(QtyToOrder) < 1:                                                       ## Elif QtyToOrder < 1
    print('You can\'t order less than 1. Try again')                            ## Print error
    enterOrder(sizeName, product, var, results, currentOrder, con, cur)         ## Call enterOrder
else:                                                                           ## else
    print('Adding to order...')                                                 ## Print addint to order
    NewStockAvab = 0                                                            ## Set NewStockAvab = 0
    costOfOrder = float(product[3])*int(QtyToOrder)                             ## costOfOrder = product[3]*QtyToOrder
    currentOrderAddRaw = str(QtyToOrder), ' x ', str(sizeName), ' ', str(product[1]), ' (GTIN: ', str(product[0]), ') @ £',   ## currentOrderAddRaw
    str(product[3]), ' = £', str(costOfOrder)
    currentOrderAdd = "".join(currentOrderAddRaw)                               ## currentOrderAdd = costOfOrder join ''
    print('Added to order!')                                                    ## Print adding to order
    print('Updating Stock Levels...')                                           ## Print updating stock levels
    QtyInt = int(QtyToOrder)                                                    ## QtyInt = QtyToOrder
    NewStockAvab = str((int(product[4])) - QtyInt)                              ## NewStockAvab = product[4] - QtyInt
    sql = ("UPDATE INVENTORY SET STOCKAVAB = '"+NewStockAvab+"' WHERE GTIN LIKE '"+product[0]+"'")                      ## SQL query
    try:                                                                        ## try
      cur.execute(sql)                                                          ## Execute SQL
      con.commit()                                                              ## Commit .db-journal
      print('Updated')                                                          ## Print 'updated'
    except:                                                                     ## SQL Rejection
      print('Error: Inventory Update failed to commit.')                        ## Print Error
      currentOrder.append(currentOrderAdd+' [CANCELLED]')                       ## append order cancellation
      print('\n\nPLEASE ENTER \'100\' TO ESCAPE ERROR\n\n')                     ## Print error escape message
      enterOrder(sizeName, product, var, results, currentOrder, cur, con)       ## Call enterOrder
    currentOrder.append(currentOrderAdd)                                        ## Call currentOrder
    again = input('Order another item? [Y/N]:\n>')                              ## Input 'again'
    if again == 'Y' or again == 'y':                                            ## If again = 'Y'
      verify(con, cur, currentOrder)                                            ## Call verify
    if again == 'N' or again == 'n':                                            ## If ayain = 'n'
      print('Order finished!')                                                  ## Print order complete
      print('Receipt:')                                                         ## Print receipt
      for order in currentOrder:                                                ## For orders in currentOrder
        print(order)                                                            ## Print 'order'

def ask(cur, con, currentOrder):                                                ## Defien ask
  askQuery = input('Press [s] to search for a product\'s GTIN number:\n> ')     ## askQuery = input 'S'
  if askQuery == 's' or askQuery == 'S':                                        ## If askQuery
    verify(con, cur, currentOrder)                                              ## Call verify
  else:                                                                         ## else
    print('Invalid Choice')                                                     ## Print invalid choice
    ask(cur, con, currentOrder)                                                 ## Call ask

ask(cur, con, currentOrder)                                                     ## Call ask
```

7.3 Task 3

```
__authors__ = ['Thomas Bass']
##    TASK 3    ##
import sqlite3 as lite                    ## Imports libraries
import random
import math
import sys
stockOrder = []
con = lite.connect('dbuse.db')            ## connects to .db
cur = con.cursor()                        ## connects to SQL
def findStock(con, cur, stockOrder):      ## Define findStock
  slq1 = 'SELECT * FROM Inventory WHERE StockAvab != TargetStock'    ## selects low stock from DBase
  cur.execute(slq1)                       ## excesutes
  results = cur.fetchall()                ## collects
  orderList = []                          ## Define orderList as array
  if str(results):                        ## If results are a string
    print('Stock is all up to date!')     ## Print stock up to date
    park()                                ## Call park
  for product in results:                 ## For results loop
    toOrder = int(int(product[5]) - int(product[4]))    ## math for how many to order
    print('Low stock! Order', toOrder, 'x', product[1], 'more to fill stock')    ## message
    if product[2] == '':                  ## If product[2] is empty
      sizeName = ''                       ## SizeName = ' '
    elif product[2] == 'Small' or product[2] == 'Medium' or product[2] == 'Large':    ## Elif
      sizeName = product[2]               ## sizeName = product[2]
  else:                                   ## Else
      sizeNameRaw = product[2], 'ml'      ## sizeNameRaw = product[2] + ml
      sizeName = "".join(sizeNameRaw)     ## sizeName = join sizeNameRaw ''
    stockOrderAddRaw = (str(toOrder), ' x ', str(sizeName), ' ', str(product[1]), ' (GTIN: ', str(product[0]), ')')    ## creates order
    stockOrderAdd = "".join(stockOrderAddRaw)    ## Join stockOrderAdd ''
    stockOrder.append(stockOrderAdd)      ## Append stockOrderAdd to stockOrder
    orderList.append(product[0])          ## Append product[0] orderList
    print('       Added to order form')   ## Print added to order
  print('\n~~~~~~~~~Stock Order Form~~~~~~~~~')    ## Print stock order form
  for i in stockOrder:                    ## Print stockOrder
    print(i)                              ## prints order
  updateContinue = input('Is the order complete? [Y/N]\n>')    ## input updateContinue
  if updateContinue == 'Y' or 'y':        ## If updateContinue = 'y' 'Y'
    updateStock(con, cur, stockOrder, toOrder, orderList)    ## Call updateStock
  else:                                   ## Else
    findStock(con, cur, stockOrder)       ## Call findStock

def updateStock(con, cur, stockOrder, toOrder, orderList):    ## Define updateStock
  ##print(orderList)                      ## ##Print order list
  print('Updating Database...')           ## Print updating database
  for productUpdate in orderList:         ## Loop in orderList
    sql2 = "UPDATE INVENTORY SET STOCKAVAB = TARGETSTOCK WHERE GTIN LIKE '"+productUpdate+"'"    ## SQL command
    try:                                  ## try
      cur.execute(sql2)                   ## Execute SQL command
      con.commit()                        ## Commit .db-journal
      print('Complete #', productUpdate)  ## Print completed number
    except:                               ## Exception
      print('An exception occured.')      ## Print exception error
      findStock(con, cur, stockOrder)     ## Call findStock

def park():                               ## Define stock
  sys.exit()                              ## Sys exit

ask = input('Press [s] to scan inventory stock levels\n> ')    ## Ask input
if ask == 's' or ask == 'S':              ## If ask = 's'
  findStock(con, cur, stockOrder)
else:
   sys.exit()                             ## Call findStock
```