

ITS100 Midterm Exam

The respondent's email (**null**) was recorded on submission of this form.

* Required

1. Email *

2. Student ID *

3. Full Name *

Part 1: Multiple-Choice Questions

Choose the most appropriate answer.

4. Select one choice only!

In Python programming language, which of the following assertions is NOT correct?

- (a) Variables represent memory locations.
- (b) Assignment statements move data into memory locations.
- (c) There are several forms of conditional statements.
- (d) A statement can be nested inside another statement.
- (e) An integer variable cannot be reassigned a boolean value.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

5. Select one choice only!

Which of the following statements produces an error at runtime?

(a) `print(1++0)`

(b) `print(1**0)`

(c) `print(1--0)`

(d) `print(1//0)` divide by 0

(e) None of the above statements produce run-time errors.

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

6. Select one choice only!

Which of the following Python programs contains a syntax error?

Program A

```
x y = 0 0
```

Program B

```
x, y = 0, 0
```

Program C

```
x = y = 0
```

- (a) Program A
- (b) Program B
- (c) Program C
- (d) All three programs have syntax errors.
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

7. Select one choice only!

Which of the following Python programs produces a runtime error?

Program A

```
x = 0
y = x + 1
x = y
```

Program B

```
x = 0
x = y = x + 1
```

chained assignment

Program C

```
x = 0
y = x + 1
x = y
```

- (a) Program A
- (b) Program B
- (c) Program C
- (d) All three programs have runtime errors.
- (e)** No programs have have runtime errors.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

8. Select one choice only!

Which statement of the following program creates the error message below:

`ValueError: invalid literal for int() with base 10: '1.0'`

```
1 print(int(1.0))
2 print(int("1.0"))
3 print(int(True))
4 print(int(False))
5 print(int(float("1.0")))
```

- (a) `print(int(1.0))` at line 1
- (b) `print(int("1.0"))` at line 2**
- (c) `print(int(True))` at line 3
- (d) `print(int(False))` at line 4
- (e) `print(int(float("1.0")))` at line 5

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

9. Select one choice only!

For which of the following input strings, two programs below print out different strings?
Note that typecast function `bool` returns `True` if given a non-empty string.

Program A

```
a, b = input("a, b = ").split()
a, b = bool(a), bool(b)
if a and b:
    print("1 1")
elif a or b:
    print("1 0, 0 1")
else:
    print("0 0 ")
```

Program B

```
a, b = input("a, b = ").split()
a, b = bool(a), bool(b)
if a or b:
    print("1 1")
elif a and b:
    print("1 0, 0 1")
else:
    print("0 0 ")
```

- (a) String "True True"
- (b) String "False False"
- (c) String "True False"
- (d) String "False True"
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

10. Select one choice only!

Suppose that `x` is a variable holding a float number. Which of the following function calls returns the same result as `math.floor(x)`?

- (a) `math.ceil(x)` `math.floot(-3.7)` `math.floor(2.1)`
- (b) `int(x)` `return -4` `return 2`
- (c) `float(x)`
- (d) `str(x)`
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

11. Select one choice only!

Alice wrote the following program to check if a given number n is a product of two consecutive natural numbers (for example, 20 is the product of 4 and 5). What could Alice write at line 3?

```
1  import math
2  n = input("n=?"); n = int(n)
3  .....
4  if n == m*(m+1):
5      print(n, "=", m, "*", m+1)
```

- (a) `m = math.sqrt(n)`
- (b) `m = math.ceil(math.sqrt(n))`
- (c) `m = math.fabs(math.sqrt(n))`
- (d) `m = int(n**0.5)`
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

12. Select one choice only!

The following program aims to compute the factorial of a positive integer n given by the user. What should be written at line 3?

```
1  n = input("n=?"); n = int(n)
2  p = 1
3  for i in .....:
4      p = p * i
5  print("n!=", p)
```

- (a) range(n)
- (b) range(0,n+1)
- (c) range(1,n)
- ☒ (d) range(1,n+1)
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

13. Select one choice only!

Alice said she run the following program and it printed out a number greater than 100000.
Which of the following conclusions you can make?

```
n = input("n=?"); n = int(n)
s = 0
for i in range(n):
    for j in range(n, i):
        s = s+i*j
print(s)
```

- (a) Alice input some number in the interval [10, 20]
- (b) Alice input some number in the interval [21, 30]
- (c) Alice input some number in the interval [31, 40]
- (d) Alice input some number in the interval [41, 100]
- ☒ (e) Alice did not tell the truth

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

14. Select one choice only!

Alice runs the following program and it prints out a number 1. Which of the following statements **must be true**?

```
n, m = input("n, m=?").split()
n, m = int(n), int(m)
s = 1
for i in range(n,m):
    for j in range(m,n):
        s = s*m**n
print(s)
```

- (a) Alice gave input string "1 2"
- (b) Alice gave input string "2 1"
- (c) Alice gave input string "0 3"
- (d) Alice gave input string "3 1"
- ☒ (e) Each of the above statements is possibly true but not necessarily.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

15. Select one choice only!

The following program aims to compute the *greatest common divisor* (gcd) of two given positive integers n and m. For example, if the user gives input string "4 10", indicating that n=4 and m=10, then the program should print out "gcd = 2". What should be the condition of the **if statement** at line 5?

```
1  n, m = input("n, m=?").split()
2  n, m = int(n), int(m)
3  gcd = 1
4  for i in range(n,0,-1):
5      if .....:
6          gcd = i
7  print("gcd =", gcd)
```

- (a) $n\%i==0$ and $m\%i==0$:
- (b) $n\%i==0$ and $m\%i==0$ and $gcd==1$:
- (c) $n\%i==0$ and $m\%i==0$ and $\text{not}(gcd == 1)$:
- (d) $n\%i==0$ or $m\%i==0$ and $gcd==1$:
- (e) $n\%i==0$ and $m\%i==0$ or $gcd==1$:

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

16. Select one choice only!

The following program checks whether an integer $n > 1$ given by the user is a prime number or not (a number is a prime number just in case it is divisible by 1 and itself only. For example 2, 3, 5 are prime numbers). Unfortunately the program contains a logical error. Where the error is?

```
1 n = input("n=?")
2 n = int(n)
3 prime = True
4 for i in range(1,n):    has to be n+1
5     if n%i==0:
6         prime = False
7 if prime:
8     print(n, " is a prime number")
9 else:
10    print(n, " is a not prime number")
```

- (a) At line 3
- (b) At line 4**
- (c) At line 5
- (d) At line 6
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

17. Select one choice only!

Alice does not know the function `str.isnumeric`, so she wrote the following program to check if an user's input `n` can be converted into an integer. What should be the statement at line 4?

```
1 n = input("n=?")
2 numeric = True
3 for c in n:
4     .....
5 if numeric:
6     print(n, " can be converted into an integer")
```

- (a) `if not (c in "0123456789"): numeric = False`
- (b) `if (c in "0123456789"): numeric = False`
- (c) `if not (c in "0123456789"): numeric = True`
- (d) `for c in "0123456789": numeric = False`
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

18. Select one choice only!

Alice wrote two program templates A and B below to demonstrate that any conditional statement of the form `if...elif...else...` can be translated into several conditional statements of the more simple form `if`

What Alice possibly wrote at line 3 of the template B?

Template A	Equivalent template B
<pre>if condition1: statement1 elif condition2: statement2 else: statement3</pre>	<pre>1 if condition1: 2 statement1 3 4 statement2 5 if not condition1 and not condition2: 6 statement3</pre>

- (a) `if condition1 and condition2:`
- (b) `if not condition1 or condition2:`
- (c) `if not (condition1 and condition2):`
- (d) `if not condition1 and condition2:`
- (e) None of the above answers are correct.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

19. sSelect one choice only!

What is the output of the following program?

```
1 print("ITS100"); print("SIIT\\")
2 print("Thammasat", end=" ")
3 print("University")
```

(a) ITS100 SIIT"
Thammasat University

(b) ITS100
SIIT"
Thammasat
University

(c) ITS100 SIIT\
Thammasat
University

(d) ITS100
SIIT"
Thammasat University

(e) ITS100 SIIT\
Thammasat University

Mark only one oval.





a



b



c



d



e

20. Select one choice only!

Which line in the following program causes an error?

```
1 n = input("Input n: ")
2 if n.isnumeric():
3     n = int(n)
4     for i in range(n):
5         for j in range(i+1):
6             print("=", end=" ")
7             print()      indent error
8 else:
9     print("Invalid input")
```

(a) Line 1

(b) Line 4

(c) Line 6

(d) Line 7

(e) Line 8

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

21. Select one choice only!

Which of the followings is the fastest memory?

(a) Static RAM (SRAM)

(b) Dynamic RAM (DRAM)

☒ (c) Registers

(d) L1 Cache memory

(e) L2 Cache memory

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

22. Select one choice only!

Which of the followings is a valid variable name according to the Python syntax?

(a) 78SIIT

(b) _abc

(c) SIIT,TU

(d) x.y

(e) interest-rate

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

23. Select one choice only!

Which of the following Python expression is equivalent to the following formula?

$$\frac{x(-1)^{x+3}}{(x+y)(x-y)}$$

(a) `x*(-1)**x+3/(x+y)/(x-y)`

(b) `x*(-1)**(x+3)/(x+y)*(x-y)`

(c) `x*-1**(x+3)/((x+y)*(x-y))`

(d) `x*(-1)**(x+3)/(x+y)/(x-y)`

(e) `(x*(-1))**(x+3)/((x+y)*(x-y))`

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

24. Select one choice only!

Which of the followings is **NOT** correct about arithmetic operators?

- (a) + is an operator to add two numbers and concatenate two strings.
- (b) * is an operator to multiply two numbers and connect two strings.
- (c) / is an operator to divide two numbers.
- (d) % is an operator to compute the remainder of a division and format a string.
- (e) ** is an operator to compute the exponentiation.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

25. Select one choice only!

Which of the following string functions work differently from the others?

- (a) `str.isupper()`
- (b) `str.isnumeric()`
- (c) `str.isalpha()`
- (d) `str.isspace()`
- ☒ (e) `str.upper()`

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

26. Select one choice only!

Which of the following Python statements generates a random integer with a minimum value of 1 and a maximum value of 9?

- (a) `random.randint(1, 10)`
- (b) `1 + random.randint(1, 8)`
- (c) `random.choice([1,9])`
- (d) `-1 + random.randint(2, 10)`
- (e) `random.shuffle(range(1, 10, 1))`

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

27. Select one choice only!

The following program randomly generates a password starting with an uppercase letter followed by a lowercase letters and exactly four digits, such as “Bm5381”, “Kw2299”. Which of the followings is the most appropriate for line 4?

```
1 import random as r
2
3 a = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
4 .....
5 print("Password =", p)
```

- (a) `p = r.choice(a)+r.choice(a)+str(r.randint(0000, 9999))`
- (b) `p = r.choice(a)*2+str(r.randint(0000, 9999))`
- (c) `p = r.choice(a)+r.choice(a).lower()+str(r.randint(1000, 9999))`
- (d) `p = str(r.choice(a)+r.choice(a).lower()+r.randint(1000, 9999))`
- (e) `p = r.choice(a)*2.capitalize()+r.randint(0000, 9999)`

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

28. Select one choice only!

Which of the following expressions is True given that $x=1$, $y=False$ and $z=15.43$?

(a) `not bool(z)`

(b) `bool(x) or bool(z)`

(c) `x > 10 and y`

(d) `not x and not y`

(e) `x >= 5 or y or z < 10`

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

29. Select one choice only!

What does the following program do?

```
1 s = input("Input: ")
2 if s.isnumeric():
3     m = 0
4     for d in s:
5         d = int(d)
6         if d > m:
7             m = d
8     print("Output: %d" % m)
9 else:
10    print("Invalid input")
```

- (a) Find the largest digit of the input integer.
- (b) Find the smallest digit of the input integer.
- (c) Find the median digit of the input integer.
- (d) Find the sum of the input digits.
- (e) Find the first digit of the input integer.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d

☐ e

30. Select one choice only!

What does the following program do?

```
1 a, b = input("Input two integers: ").split()
2 if a.isnumeric() and b.isnumeric():
3     a, b = int(a), int(b)
4     c = a + b
5     a = c - a
6     b = c - a
7     print("Output: %d %d" % (a, b))
8 else:
9     print("Invalid input")
```

- (a) Find the sum of a and b.
- (b) Find the difference between a and b.
- (c) Find the minimum value between a and b.
- (d) Exchange the values of a and b.
- (e) Exchange the values of a, b and c.

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

31. Select one choice only!

How many asterisks are printed by the following program?

```
1 for i in [1, 10, 2]:  
2     for j in range(i):  
3         print("*", end="")  
4     print()
```

(a) 13

(b) 25

(c) 100

(d) 30

(e) 200

Mark only one oval.

☐ a

☐ b

☐ c

☐ d

☐ e

32. Select one choice only!

How many lines are there in the output of the following program?

```
1 for i in range(100):  
2     for j in range(100):  
3         print("*", end="")  
4         if j % 10 == 0 and j > 50:  
5             print("*")  
6     print("#")
```

- (a) 500
- (b) 10000
- (c) 5000
- (d) 100
- (e) 50

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d
- ☐ e

33. Select one choice only!

The following program converts an input binary string into its equivalent decimal value. For example, when the user inputs "1110", the program outputs 14. Which of the following statements is the most appropriate for line 6?

```
1 binary = input("Input a binary string: ")
2 output = 0
3 for d in binary:
4     if d in "01":
5         d = int(d)
6         .....
7 print("Output =", output)
```

- (a) `output += d`
- (b) `output += d*2`
- (c) `output = output*2 + d`
- (d) `output *= d`
- (e) `output += 2**d`

Mark only one oval.

- ☐ a
- ☐ b
- ☐ c
- ☐ d

Part 2: Short/Long-Answer
Questions

Provide only one answer in the blank space. Write the answer in your own words.
Plagiarism will be checked.

34. Write one answer in your own words.

A **print statement** can have multiple input parameters, for example `print(x,y,z)` has three parameters `x`, `y`, `z` being variables. Write a print statement **with only one parameter** that prints the same output as `print(x,y,z)`. Suppose that `x` is an integer variable, `y` is a Boolean variable, and `x` is a string variable.

`print(f"{x} {y} {z}")`

35. Write one answer in your own words.

We say that an operator is *overloaded* if it has more than one meaning. For example, `+` is an overloaded operator in Python because it means addition when used between two numbers, like in the expression `1+2`; but it means concatenation when used between two strings, like in the expression `"Hello " + "world"`. **List two other overloaded operators of Python that you have learned.** For each operator, give two sample expressions in which the operator has different meanings.

`*` for multiplication and repetition of string

`%` modulus and string formatting operator

36. Write one answer in your own words.

Write a program that receives from the user an integer n then prints out a rectangle of size $n \times 2n$ as demonstrated by three sample runs below.

$n=?3$

```
* * * * *
* - - - -
* * * * *
```

$n=?4$

```
* * * * *
* - - - -
* - - - -
* * * * *
```

$n=?5$

```
* * * * *
* - - - -
* - - - -
* - - - -
* * * * *
```

```
n = int(input("n=?"))
```

```
for r in range(n):
```

```
    for c in range(n*2):
```

```
        if r == 0 or r == n-1:
```

```
            print("*", end="")
```

```
        elif c == 0 or c == n*2-1:
```

```
            print("*", end="")
```

```
        else:
```

```
            print("-", end="")
```

```
    print()
```

37. Write one answer in your own words.

Write a program that receives a positive integer n from the user, then prints out the smallest square number $m \geq n$ as demonstrated by three sample runs below.

n=? 4
m=4

n=? 5
m=9

n=?10
m=16

```
for i in range(n):  
    if i**2 >= n:  
        print(f"m={i**2}")  
        break
```

```
n = input("n=?")
```

38. Write one answer in your own words.

Write a program asking the user an integer n , then prints YES if all digits of n occur in your student ID; prints NO otherwise. For example, the sample runs below assume that your student ID is 123456780.

n=? 123
YES

n=? 9
NO

n=? 19
NO

```
student_id = "123456780"  
  
output = "YES"  
  
for i in n:  
    if i not in student_id:  
        output = "NO"  
        break  
  
print(output)
```

Part 3: Short/Long-Answer
Questions

Provide only one answer in the blank space. Write the answer in your own words.
Plagiarism will be checked.

39. Write one answer in your own words.

What is the output of the following program
when you input your student ID? **6622770368**

```
1 n = input("Input: ")
2 if n.isnumeric():
3     n = int(n)
4     for i in range(10):
5         d = n%10
6         if d > 5:
7             print(d, end="")
8         n //= 10
9     print()
10 else:
11     print("invalid input")
```

Explanation: The program receives 10 integers, student ID, as input and will check if the input is numeric. If it is not, it will print "invalid input". If it is, it will convert the input from a string to an int and will enter a loop i in range(10), then it will initialize a variable, d, as n % 10, which is the last(right-most) digit of the input. If that last digit is more than 5 it will print that number, if not it will move on to the next digit from right to left without printing. After exhausting the digits, it will print a new empty line.

Short explanation: The program takes a numeric input from the user and extract the digits one-by-one and print the ones that are greater than 5 in reverse order.

Answer: **867766**

40. Write one answer in your own words.

What does the following program do? Explain in plain English within 20 words. Exceeding 20 words results in 0 point.

```
1 n = input("Input: ")
2 p = q = 0
3 for c in n:
4     if c.isalpha():
5         p += 1
6     elif c.isnumeric():
7         q += 1
8 print("Output =", p == q)
```

The program will output True if the number of alpha char and numeric char is equal, and False if not.

41. Write one answer in your own words.

What does the following program do? Explain in plain English within 20 words. Exceeding 20 words results in 0 point.

```
1 import random as r
2
3 n = input("Input n: ")
4 if n.isnumeric():
5     n = int(n)
6     x = r.randint(0, 9)
7     output = (x * 10**(n-2) +
8               r.randint(0, 10**(n-2)-1))*10 + x
9     fmt = "Output = %0" + str(n) + "d"
10    print(fmt % output)
11 else:
12    print("invalid input")
```

Generates a random number n long. The first and last digit is the same; the digits in between are random.

42. Write one answer in your own words.

Complete the following program by filling the blank between line 3 and line 5 with appropriate statements. You can use as many statements as you prefer.

This program accepts a month number (1-12) from the user. It then outputs the number of days in that month. For example, the program outputs 31 when the user inputs 1. Note that the program should output “28 or 29 days” when the user inputs 2. The program should output “Invalid input” when the user inputs a value other than 1-12.

```
1 n = input("Input: ")
2 if n.isnumeric():
3     n = int(n)
4     .....
5 else:
6     print("Invalid input")
```

```
if 1 <= n <= 12:
    if n == 2:
        print("28 or 29 days")
    elif n in [4, 6, 9, 11]:
        print("30 days")
    else:
        print("31 days")
else:
    print("invalid input")
```

43. Write one answer in your own words.

Complete the following program by filling the blank between line 3 and line 5 with appropriate statements to make it compute and display the following formula.

$$x = \sum_{i=1}^n \frac{(-1)^i a}{a^{i+1} b^{1-i}}$$

where a is the last digit of your student ID and b is the second to last digit of your student ID. For example, if your student ID is 6422771234, then $a = 4$ and $b = 3$.

6622770368
a = 8
b = 6

```
1 n = input("Input: ")
2 if n.isnumeric():
3     n = int(n)
4     .....
5     print("Output = %f" % x)
6 else:
7     print("Invalid input")
```

```
for i in range(1, n+1):
    x += ((-1)**i * a) / (a**(i+1) * b**(1-i))
```

-----or-----

```
for i in range(1, n+1):
    x += ((-1)**i * 8) / (8**(i+1) * 6**(1-i))
```

This content is neither created nor endorsed by Google.

Google Forms