

# CORE 109: Exam 1 ♠

Duration: 65 minutes

Name: \_\_\_\_\_

NetID: \_\_\_\_\_

Student to your left:

\_\_\_\_\_

Student to your right:

\_\_\_\_\_

DO NOT OPEN THIS EXAM UNTIL INSTRUCTED

## Instructions:

- Write your full name and your NetID on the front of this exam.
- Write the names of students sitting to your left and right.
- Make sure that your exam is not missing any sheets. There should be five (5) double sided pages in the exam.
- Write your answers in the space provided below each problem. If you make a mess, clearly indicate your final answer (or state that it is on the scrap paper).
- If you have any questions during the exam, raise your hand and we will get to you.
- At the end of the exam, there is one blank page. Use this as your scrap paper. If you need additional scrap paper, raise your hand and we will get it for you.
- This exam is closed books, closed notes, closed computers. You are allowed one double sided page of your own notes. You are allowed to use the calculator on the computer in front of you. You are NOT allowed to use the computer for any other purpose.
- **You need to stay in your seat until the exam is finished.** You should not leave the room even if you finish the exam. This distracts other students who are still working.

Good luck!





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**Problem 1 (10 points).**

You have \$1,000.00 to invest.

- **DimeNational** bank offers you a savings account that pays \$50.00 flat bonus at the end of every year for which you keep the money in their account.
- **PennySelect** offers you a savings account that pays 4.5% interest at the end of each year for which you keep the money in their account. (It is 4% of the account balance, so the actual amount varies from year to year.)

Once you invest the initial amount, no money is going to be removed or added to the account (except for the interest payments).

A. What is the function that represents the amount of money at DimeNational at the end of each year?

B. What is the function that represents the amount of money at PennySelect at the end of each year?

**Problem 2 (5 points).**

Assume that a single sheet of paper is 0.002 inch in thickness. Write down the formula for the thickness of the sheet of paper folded  $n$  times. You should try to figure out the pattern using small values for  $n$  first.



**Problem 3 (14 points).**

A. Kevin's credit card bill is \$100.00. The minimum payment due each month is \$20.00. The monthly interest rate is 1.4%. How many months will it take him to pay off the credit card if he always makes only the minimum payment? State the balance that Kevin owes at the end of each month (at the end of month zero his balance is \$100.00 - he pays \$20.00 and carries over \$80.00 to the next month. The bank will be charging the interest on the \$80.00).

B. Kevin's credit card bill is \$100.00. The minimum payment due each month is \$20.00. The monthly interest rate is 1.4%. **Kevin decides to pay off the debt by paying \$40.00 each month (double the required minimum payment).** How many months will it take him to pay off the credit card? State the balance that Kevin owes at the end of each month (at the end of month zero his balance is \$100.00 - he pays \$40.00 and carries over \$60.00 to the next month. The bank will be charging the interest on the \$60.00).



### Problem 4 (13 points).

The following program should calculate the weekly pay including the overtime for hours worked over 40 hrs/week calculated at 1.5 times the regular pay rate. The lines of the program have been sorted in alphabetical order and all of the indentation is gone.

```
else:  
  
hours = float(input("How many hours did you work this week? "))  
  
if hours < 40:  
  
ot_pay = (hours-40) * (rate*1.5)  
  
pay = rate * 40 + ot_pay  
  
pay = rate * hours  
  
print ("Your total pay is", pay)  
  
rate = float(input("How much do you make per hour? "))
```

Write the correct program using the lines above.

### Problem 5 (18 points) Tracing Code Output.

Given the following code fragments what is the output? (Write your answers below each code fragment.)

```
a = 5
b = int(input('Enter a number: '))

if a < b :
    print ( "A" )
if a > b :
    print ( "B" )
if a * 2 == b:
    print ( "C" )
if b < a:
    print ( "D" )
else
    print ( "E" )
```

Assume user enters 10 at the prompt.

```
a = 5
b = int(input('Enter a number: '))

if a < b :
    print ( "A" )
elif a > b :
    print ( "B" )
elif a * 2 == b:
    print ( "C" )
elif b < a:
    print ( "D" )
else
    print ( "E" )
```

Assume user enters 10 at the prompt.

```
a = 5
b = int(input('Enter a number: '))

if a < b :
    print ( "A" )
elif a > b :
    print ( "B" )
elif a * 2 == b:
    print ( "C" )
elif b < a:
    print ( "D" )
else
    print ( "E" )
```

Assume user enters 5 at the prompt.

```
c = 0
for x in range(10):
    c += 1
print (c)
```

```
for q in range(100,50,-10):
    print (q)
```

```
for x in range(3):
    for y in range(4):
        print (x,y,x+y)
```



## Problem 6 (20 points) Tax and Tip Calculator.

In NYC the sales tax is 8.875%. Write a program that given the amount of a restaurant bill calculates the tax due, the suggested 20% tip amount and the total amount to be paid.

The user should be prompted only for the bill amount.

You can assume that the user always enters valid input.

Here are two sample runs of the program:

### Output:

```
What is your bill?  
30.00  
  NYC tax is $2.66  
  20% tip is $6.00  
  
Your total bill is $38.66
```

### Output:

```
What is your bill?  
30.00  
  NYC tax is $2.66  
  20% tip is $6.00  
  
Your total bill is $38.66
```



### Problem 7 (20 points).

Write a program that prompts the user for a positive integer and prints all **odd powers** of two from zero to that integer one per line. The program should make sure that the user enters a positive integer and if not, prompt the user again. You do not need to worry about the alignment.

Here are two sample runs of the program:

**Output:**

```
Enter a number: 5
2 ^ 1 = 2
2 ^ 3 = 8
2 ^ 5 = 32
```

**Output:**

```
Enter a number: 17
2 ^ 1 = 2
2 ^ 3 = 8
2 ^ 5 = 32
2 ^ 7 = 128
2 ^ 9 = 512
2 ^ 11 = 2048
2 ^ 13 = 8192
2 ^ 15 = 32768
2 ^ 17 = 131072
```





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