PYTHON AND CONTROL

COMPUTER SCIENCE MENTORS

August 31 - September 4, 2020

1 Intro to Python

1. What Would Python Display?

```
>>> 3
```

Solution: 3

```
>>> "csm"
```

Solution: 'csm'

```
>>> x = 3
>>> x
```

Solution: 3

```
>>> x = print("csm")
csm
>>> x
```

Solution: None

```
>>> print(print(print("csm")))
```

Solution: csm
None
None

```
>>> def f1(x):
...     return x + 1
>>> f1(3)
```

Solution: 4

```
>>> f1(2) + f1(2 + 3)
```

Solution: 9

```
>>> def f2(y):
...     return y / 0
>>> f2(4)
```

Solution: ZeroDivisionError: division by zero

```
>>> def f3(x, y):
...     if x > y:
...             return x
...     elif x == y:
...             return x + y
...     else:
...             return y
>>> f3(1, 2)
```

Solution: 2

```
>>> f3(5, 5)
```

Solution: 10

```
>>> 1 or 2 or 3
```

Solution: 1

```
>>> 1 or 0 or 3
```

Solution: 1

```
>>> 4 and (2 or 1/0)
```

Solution: 2

```
>>> 0 or (not 1 and 3)
```

Solution: False

```
>>> (2 or 1/0) and (False or (True and (0 or 1)))
```

Solution: 1

2. For the following expressions, list the order of evaluation of the operators and operands of the expression.

```
Example: add(3, mul(4, 5)) -> add, 3, mul, 4, 5
```

(a) `add(1, mul(2, 3))`

Solution: add, 1, mul, 2, 3

(b) `add(mul(2, 3), add(1, 4))`

Solution: add, mul, 2, 3, add, 1, 4

(c) `max(mul(1, 2), add(5, 6), 3, mul(mul(3, 4), 1), 7)`

Solution: max, mul, 1, 2, add, 5, 6, 3, mul, mul, 3, 4, 1, 7

2 Control

1. Write a function that returns true if a number is divisible by 4 and false otherwise.

Solution:

```
def is_divisible_by_4(num):
    return num % 4 == 0
```

2. Write a function, `is_leap_year`, that returns true if a number is a leap year and false otherwise. A *leap year* is a year that is divisible by 4 but not divisible by 400.

Solution:

```
def is_leap_year(year):
    return year % 4 == 0 and year % 400 != 0
```

3. Write a function `find_max` that will take in 3 numbers, `x`, `y`, `z`, and return the max value. Assume that `x`, `y`, and `z` are unique. Do not use Python's built-in `max` function.
   def `find_max(x, y, z):`

Solution:

```
def find_max(x, y, z):
    if x > y and x > z:
        return x
    elif y > x and y > z:
        return y
    else:
        return z
```

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