CSE 280 Challenge Set 09

Question 1

List the first 5 terms (use fractions instead of decimals) for the following sequences:

- A geometric sequence in which the first value is 1 and the common ratio is $-\frac{1}{2}$.
- An arithmetic sequence in which the first value is 1 and the common difference is $-\frac{1}{2}$.
- A geometric sequence in which the first value is -1 and the common ratio is $-\frac{1}{2}$.
- An arithmetic sequence in which the first value is -1 and common difference is $-\frac{1}{2}$.

Question 2

Part 1

Evaluate the following:

- $\sum_{i=0}^{5} i^2$
- $\sum_{i=0}^{5} i^2 + 3 - 2i$

Part 2

Evaluate the following arithmetic and geometric sums using the closed form formulas:

- $\sum_{i=0}^{99} 3 - 2i$
- $\sum_{i=0}^{10} 2 \cdot 3^i$

Question 3

Part 1

After reviewing the following python code, predict what will be displayed.

```
def getValue1(n):
    if n == 0:
        return 2
    if n == 1:
        return 1
    return getValue1(n-1) - getValue1(n-2)

print([getValue1(n) for n in range(20)])
```

Part 2

After reviewing the following python code, predict what will be displayed. Note that `a % b` will return the integer remainder when we divide `a` and `b`. For example:

- `18 % 5 = 3`
- `31 % 13 = 5`
- `8 % 14 = 8`

```
def getValue2(a,b):
    if b == 0:
        return a
    return getValue2(b, a % b)

print(getValue2(12,15))
print(getValue2(64,24))
print(getValue2(17,31))
print(getValue2(121,88))
```

Part 3

What mathematical problem is the `getValue2` function solving?

Question 4

What activity does the following recurrence relation perform:

$$F(A, B, [First|Rest]) = \begin{cases} B + F(A, B, Rest) & \text{if } First == A \\ First + F(A, B, Rest) & \text{else} \end{cases}$$

$F(A, B, [\,]) = [\,]$