Project 2

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Contents

1 Python Code

```python
from math import factorial

def Pascal(numRows):
    triangle=""
    for i in range(numRows+1):
        for j in range(numRows-i+1):
            triangle+="  "
        # loop to get elements of row i
        for j in range(i+1):
            # nCr = n!/((n-r)!*r!)
            num=factorial(i)
            den=factorial(j)*factorial(i-j)
            triangle+=( str(num//den) + "    " )

        triangle+="\n"

    return triangle
```

2 Print Pascal's Triangle

2.1 $(s-t)^{10}$

```
Pascal(10)
```

```
                    1
                 1     1
              1     2     1
           1     3     3     1
        1     4     6     4     1
     1     5    10    10     5     1
  1     6    15    20    15     6     1
1     7    21    35    35    21     7     1
1   8    28    56    70    56    28    8    1
1   9   36    84   126   126   84   36    9   1
1   10   45   120   210   252   210   120   45   10   1
```

Binomial Expansion: $s^{10}+10s^9t+45s^8t^2+120s^7t^3+210s^6t^4+252s^5t^5+210s^4t^6+120s^3t^7+45s^2t^8+10st^9+t^{10}$

2.2 $(2x + y)^5$

```
Pascal(5)
```

```
              1
          1       1
       1      2      1
    1     3      3      1
  1    4     6     4     1
1   5    10      10     5     1
```

Binomial Expansion: $2x^5 + 5(2x)^4 y + 10(2x)^3 y^2 + 10(2x)^2 y^3 + 5(2x)y^4 + y^5$

3 List elements of a power set

3.1 Python

```python
from itertools import chain, combinations

def powerset(given):
    s=list(given)
    result=chain.from_iterable(combinations(s,r) for r in
    ↪   range(len(s)+1))
    return list(result)
```

3.2 (a, b, c, d, e)

```python
my_set={'a','b','c','d','e'}
seta=powerset(my_set)
seta
```

```
[(), ('b',), ('a',), ('d',), ('e',), ('c',), ('b', 'a'), ('b',
↪ 'd'), ('b', 'e'), ('b', 'c'), ('a', 'd'), ('a', 'e'),
↪ ('a', 'c'), ('d', 'e'), ('d', 'c'), ('e', 'c'), ('b', 'a',
↪ 'd'), ('b', 'a', 'e'), ('b', 'a', 'c'), ('b', 'd', 'e'),
↪ ('b', 'd', 'c'), ('b', 'e', 'c'), ('a', 'd', 'e'), ('a',
↪ 'd', 'c'), ('a', 'e', 'c'), ('d', 'e', 'c'), ('b', 'a',
↪ 'd', 'e'), ('b', 'a', 'd', 'c'), ('b', 'a', 'e', 'c'),
↪ ('b', 'd', 'e', 'c'), ('a', 'd', 'e', 'c'), ('b', 'a',
↪ 'd', 'e', 'c')]
```

```
len(seta)
```

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3.3 $(2, 4, 6, 8, 10, one)$

```
my_set={2,4,6,8,10,'one'}
setb=powerset(my_set)
setb
```

```
len(setb)
```

64

3.4 $(a, 1, b, 2, c, 3, 6, 9, 12, 15, 4, 8, 16)$

```
my_set={'a', 1, 'b', 2, 'c', 3, 6, 9, 12, 15, 4, 8, 16}
setc=powerset(my_set)
len(setc)
```

8192

3.5 $(3, 1, 24, 5, 9, 10, 11, 16, 29, 37, 54, 42, 18)$

```
my_set={3, 1, 24, 5, 9, 10, 11, 16, 29, 37, 54, 42, 18}
```

```
setd=powerset(my_set)
len(setd)
```

```
8192
```

3.6 Function to find powerset length

In general, the length of a powerset will be 2^n, where n is the number of elements in a set.