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BSCS-2B Laboratory 4

Given the binomial expressions below, create the codes that will compute the coefficients of its expansion and put it inside a list accordingly.

lab4.py

```python
from math import comb

# Define the binomial expressions and their corresponding x, y, and n values
expressions = [
    {"expression": "(x + 2y)⁵", "x": 1, "y": 2, "n": 5},
    {"expression": "(2x - 2y)⁶", "x": 2, "y": -2, "n": 6},
    {"expression": "(x + 3y)⁷", "x": 1, "y": 3, "n": 7},
    {"expression": "(-3x - y)⁸", "x": -3, "y": -1, "n": 8},
    {"expression": "(4x + 3y)¹⁰", "x": 4, "y": 3, "n": 10},
    {"expression": "(-5x - 2y)¹²", "x": -5, "y": -2, "n": 12},
    {"expression": "(3x + y)¹⁴", "x": 3, "y": 1, "n": 14},
    {"expression": "(-x - 2y)¹⁶", "x": -1, "y": -2, "n": 16},
    {"expression": "(2x + y)¹⁸", "x": 2, "y": 1, "n": 18},
    {"expression": "(2x - 4y)²⁰", "x": 2, "y": -4, "n": 20}
]

# Function to compute coefficients of binomial expansion
def compute_coefficients(x, y, n):
    coefficients = []
    for i in range(n + 1):
        coefficients.append(comb(n, i) * (x ** (n - i)) * (y ** i))
    return coefficients

# Compute coefficients for each expression
coefficients_list = [compute_coefficients(exp["x"], exp["y"], exp["n"]) for exp in expressions]

# Print the results
for i, coefficients in enumerate(coefficients_list, start=1):
    print(f"Binomial expression {i}: {coefficients}")
```

1. $(x + 2y)^5$

```
Binomial expression 1: [1, 10, 40, 80, 80, 32]
```

2. $(2x - 2y)^6$

```
Binomial expression 2: [64, -384, 960, -1280, 960, -384, 64]
```

3. $(x + 3y)^7$

```
Binomial expression 3: [1, 21, 189, 945, 2835, 5103, 5103, 2187]
```

4. $(-3x - y)^8$

```
Binomial expression 4: [6561, 17496, 20412, 13608, 5670, 1512, 252, 24, 1]
```

5. $(4x + 3y)^{10}$

```
Binomial expression 5: [1048576, 7864320, 26542080, 53084160, 69672960, 62705664, 39191040, 16796160,
4723920, 787320, 59049]
```

6. $(-5x - 2y)^{12}$

```
Binomial expression 6: [244140625, 1171875000, 2578125000, 3437500000, 3093750000, 1980000000, 924000000,
 316800000, 79200000, 14080000, 1689600, 122880, 4096]
```

7. $(3x + y)^{14}$

```
Binomial expression 7: [4782969, 22320522, 48361131, 64481508, 59108049, 39405366, 19702683,
 7505784, 2189187, 486486, 81081, 9828, 819, 42, 1]
```

8. $(-x - 2y)^{16}$

```
Binomial expression 8: [1, 32, 480, 4480, 29120, 139776, 512512, 1464320, 3294720, 5857280,
8200192, 8945664, 7454720, 4587520, 1966080, 524288, 65536]
```

9. $(2x + y)^{18}$

```
Binomial expression 9: [262144, 2359296, 10027008, 26738688, 50135040, 70189056, 76038144,
65175552, 44808192, 24893440, 11202048, 4073472, 1188096, 274176, 48960, 6528, 612, 36, 1]
```

10. $(2x - 4y)^{20}$

```
Binomial expression 10: [1048576, -41943040, 796917760, -9563013120, 81285611520,
-520227913728, 2601139568640, -10404558274560, 33814814392320, -90172838379520, 19
8380244434944, -360691353518080, 541037030277120, -665891729571840, 66589172957184
0, -532713383657472, 332945864785920, -156680406958080, 52226802319360, -109951162
77760, 1099511627776]
```