ERT_Mariano_Demo

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[1]:
```python
import sympy as sp

# Mariano Recurrence (ERT Step 3)
def mariano_seq(n_max):
    seq = [0] * (n_max + 1)
    seq[1] = 1
    seq[2] = 1
    for i in range(3, n_max + 1):
        seq[i] = seq[i-1] + seq[i-2] + (i - 1)
    return seq[1:]

modes = mariano_seq(20)
for i, m in enumerate(modes, 1):
    print(f"M_{i}: {m}")

coeff2 = sp.Rational(100, 9)
m10 = modes[9]  # M_10 = 242
light_paths = 47185920  # From ERT Step 2
cosmic_states = m10 * light_paths * coeff2
print("Cosmic states example (M10 scaled):", int(cosmic_states))
```

```
M_1: 1
M_2: 1
M_3: 4
M_4: 8
M_5: 16
M_6: 29
M_7: 51
M_8: 87
M_9: 146
M_10: 242
M_11: 398
M_12: 651
M_13: 1061
M_14: 1725
M_15: 2800
M_16: 4540
M_17: 7356
```

```
M_18: 11913
M_19: 19287
M_20: 31219
Cosmic states example (M10 scaled): 126877696000
```

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