```
def power(x, p):
    if p == 0:                          → c1 · 1
        return 1                        → c2 · 1 (max)
    else:
        exponential = 1                 → c3 · 1
        for _ in range(p):              → c4 · p
            exponential = exponential * x → c5 · p
        return exponential              → c6 · 1 (max)
```

$T(n) = c_1 + \max(c_2, c_6) + c_3 + c_4 p + c_5 p$

$T(n) = c_6 + c_7 p$

$T(n) \leq (c_6 + c_7) p$ when $p \geq 1$

$T(n) \leq c_8 p$

max # of multiplications for polynomial degree n is $\frac{1}{2}n^2 + \frac{1}{2}n$

$p_{max} = n$

```
def evaluate_polynomial(A, x)
    y = 0                               → c9 · 1
    for i in range(len(A)):             → c10 · n
        y = y + A[i] * power(x, i)      → c11 · Σ_{p=0}^{n} p = c11 · (1/2)n^2 + (1/2)n
    return y                            → c12 · 1
```

$T(n) = c_9 + c_{10} n + c_{11}\left(\frac{1}{2}n^2 + \frac{1}{2}n\right) + c_{12}$

$T(n) = c_9 + c_{10} n + \frac{c_{11}}{2}n^2 + \frac{c_{11}}{2}n + c_{12}$

$T(n) = (c_9 + c_{12}) + (c_{10} + \frac{c_{11}}{2})n + \frac{c_{11}}{2}n^2$

$T(n) = c_{13} + c_{14} n + c_{15} n^2$

$T(n) \leq (c_{13} + c_{14} + c_{15}) n^2$ when $n \geq 1$

$T(n) \leq c_{16} n^2$

$T(n) = O(n^2)$

polynomial degree	# of multiplications
0	0
1	$0 + 1 \cdot x = 1$
2	$0 + 1 \cdot x + 1 \cdot x \cdot x = 0 + 1 + 2 = 3$
3	$0 + 1 \cdot x + 1 \cdot x \cdot x + 1 \cdot x \cdot x \cdot x = 0 + 1 + 2 + 3 = 6$
4	$0 + 1 + 2 + 3 + 4 = 10$

# of multiplications $= 0 + 1 + 2 + 3 + 4 + \ldots + n$ ← degree of polynomial

# of multiplications $= \sum_{p=0}^{n} p = \frac{n(n+1)}{2} = \frac{1}{2}n^2 + \frac{1}{2}n$