$A(x)\cdot B(x) = \sum_{K=startA}^{finishA} terms[K]\cdot B(x)$. $\therefore$ The function pmult correctly computes the multiplication of the given two polynomials A and B. $\square$

Time Complexity

- Let, polynomial A and B have m and n terms respectively.

$\therefore$ (finishA − startA) + 1 = m and (finishB − startB) + 1 = n

$\therefore$ For each value of i, the inner loop runs for $\theta(n)$ times

$\therefore$ Total runs of inner loop $\theta(mn)$, since no. of iterations of outer loop statement is $\theta(m)$.

- From correctness, we know for each call to padd function, polynomial y has n terms. Initially x has n terms.
- In the worst case, the no. of terms of x follows the series throughout the iterations: $n, 2n, 3n, 4n, \ldots\ldots, (m-1)n$
- Each iteration of the padd function on line 15 in the worst case takes : $\theta(2n) + \theta(3n) + \theta(4n) + \ldots\ldots + \theta((m-1)n) = O(m^2n) \rightsquigarrow$ worst case upper bound.

4) Write a function, peval, that evaluates a polynomial at some value, x_0. Try to minimize the no. of operations. (This problem is not so easy, especially coming up with the optimal algorithm and giving the proof of optimality in the no. of operations. I am skipping it for now)

5) Let $A(x) = x^{2n} + x^{2n-2} + \ldots\ldots + x^2 + x^0$ and $B(x) = x^{2n+1} + x^{2n-1} + \ldots\ldots + x^3 + x^1$. For these polynomials, determine the exact no. of times each statement of padd is executed.

- It's easy to see that line 3 will be executed 1 time.