CS 313
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Polynomial LinkedList

- has format like following:
  - $3x^2 + 1$
  - $5x^4 + x^3 + 2x$

- number of terms varies

- one term as one node and linked all terms of one polynomial in a polynomial LinkedList

- Each node stores the coefficient and the exponent of the term
Nodes of Polynomial-LinkedList:

- coefficient, exponent, reference to next term node.

```java
class PNode{
    int coe;
    int exp;
    PNode next;
}
```
addition

- add two polynomials
  - $2x^3 + 1$
  - $5x^4 + x^3 + 2x$

- Add one after another then reduce

- Insert one after another

- Combine both
multiplication

- multiply two polynomials like math
  - $2x^3 + 1$
  - $5x^4 + x^3 + 2x$

- multiply each term in second polynomial to the first polynomial, then add all terms together
  - $5x^4 * 2x^3 + 5x^4 * 1 + x^3 * 2x^3 + x^3 * 1 + 2x * 2x^3 + 2x * 1$

- Can be done by a nested loop, outer loop go through all the terms/nodes in second pLL, inner loop multiply each term in first pLL by outer loop terms.
  - But, the sum pLL is not ordered.

- Note: after each inner loop is finished, the result is ordered
multiplication
- multiply two polynomials like math
- \(2x^3 + 1\)
  \(- 5x^4 + x^3 + 2x\)

- multiply first term in second polynomial to all terms of first polynomial, the result is ordered
  \(- 5x^4 \times 2x^3 + 5x^4 \times 1\)

- multiply second term in second PLL to all terms of first PLL.
  \(- x^3 \times 2x^3 + x^3 \times 1\)

- add these two ordered PLL using add method

- multiply last term in second PLL, then add to previous PLL
  \(- 2x \times 2x^3 + 2x \times 1\)