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* Define Dynamic Programming and explain with different examples.

Ans: Dynamic programming is both a mathematical optimization method and computer programming method. Dynamic programming is mainly an optimization over plain recursion.

For example, if we write simple recursive solution for Fibonacci Numbers, we get exponential time complexity and if we optimize it by storing solutions of subproblems, time complexity reduces to linear.

```
int fib(int n)
```

```
{  
    if (n <= 1)
```

```
        return n;
```

```
    return fib(n-1) + fib(n-2);
```

```
} (Dynamic program exponential)
```

* Dynamic program linear

$$f[0] = 0;$$

$$f[1] = 1;$$

for ($i = 2; i \leq n; i++$)

{
 $f[i] = f[i-1] + f[i-2];$
}

return ~~50~~ $f[n];$