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I pledge my honor that I have abided by the Stevens Honor System

Pg. 67

4. a. Computes the sum of squares up to n.

b. The addition of the square of i to S

c. Executed n times

d. Using the summation formula $\frac{n(n+1)(2n+1)}{6}$ would be much faster and would not need to iterate at all.

Pg. 76

1. a. $x(n) = x(n-1) + 5 \quad n > 1 \quad x(1) = 0$

$(x(n-2)+5)+5$

$(x(n-3)+5)+5$

$x(n-3)+5 \cdot 3$

$x(n-i)+5i \quad n-i=1$

$x(n-n+1)+5(n-1) \quad i=n-1$

$x(1)+5(n-1)$

$0+5(n-1) = 5(n-1)$

b. $x(n) = 3x(n-1) \quad n > 1 \quad x(1) = 4$

$3x(n-2)$

$3(3(3x(n-3)))$

$3^3 x(n-3)$

$3^i x(n-i) \quad n-i=1$

$3^{n-1} x(n-n+1) \quad i=n-1$

$3^{n-1}(x(1))$

$= 3^{n-1}(4)$

c. $x(n) = x(n-1) + n$

$x(n-2) + (n-1) + n$ $\quad n > 0 \quad x(0) = 0$

$x(n-3) + (n-2) + (n-1) + n$

$x(n-i) + (n-i+1) + (n-i+2) + (n-i+3)$

$n - i = 0$

$n = i$

$x(n-n) + (n-n+1) + (n-n+2) + (n-n+3)$

$0 + 1 + 2 + 3 + \dots$

$\frac{n(n+1)}{2}$

d. $x(n) = x(n/2) + n$ $\quad n > 1 \quad x(1) = 1$

$x\left(\frac{2^k}{2}\right) + 2^k$ $\quad$ Solve $n = 2^k$

$x(2^{k-1}) + 2^k$

$x(2^{k-2}) + 2^{k-1} + 2^k$

$x(2^{k-3}) + 2^{k-2} + 2^{k-1} + 2^k$

$x(2^{k-i}) + 2^{k-i+1} + 2^{k-i+2} + 2^{k-i+3}$

$k - i = 0$

$k = i$

$x(2^{k-k}) + 2^1 + 2^2 + 2^3$

$x(1) + 2 + 2^2 + 2^3 = 1 + 2 + 2^2 + 2^3$

$2^{k+1} - 1 = 2 \cdot 2^k - 1 = 2n - 1$

d. $x(n) = x(n/3)+1$ $n>1$, $x(1)=1$, $n=3^k$

$x(\frac{3^k}{3})+1$

$x(3^{k-1})+1$

$x(3^{k-2})+1+1$

$x(3^{k-3})+1+1+1$

$x(3^{k-i})+i \cdot 1$

$x(3^{k-k})+k \cdot 1$ $k-i=0$, $i=k$

$x(1)+k$

$= 1+k$ $n=3^k$

$= 1+\log_3 n$ $k=\log_3 n$

3. a. $x(n) = x(n-1)+2$ $x(1)=0$

$x(n-2)+2+2$

$x(n-3)+2+2+2$

$x(n-3)+3\cdot 2$

$x(n-i)+2i$ $n-i=1$

$x(n-n+1)+2(n-1)$ $i=n-1$

$x(1)+2(n-1)$

$= 0+2(n-1)$

$2(n-1)$

b. non recursively the equation would be [illegible] a for loop (2 to n) it would be $\Theta(n)$ and be faster because it does not use the stack like recurs