iterative Fibonacci alg'm: asymptotic analysis

- **number of bits to represent n in Θ(lg n)**
- **addition, sum n, takes time Θ(lg n)**
- **f(n): Fibonnaci(n) R(n): runtime of ifib(n)**
- **ifib(n): add f(0) to f(1), f(1) to f(2), f(2) to f(3), . . .**
- **create sums f(2), f(3), f(4), . . .**
- **R(n) in Θ(lg(f(2)) + lg(f(3)) + lg(f(4)) + . . .)**
- **R(n) in $\Theta(\sum_{j=2}^{n}$ lg(f(j))**
- **Binet: f(n)** $= (g^n - h^n)/\sqrt{5}$**,** $g = (1+\sqrt{5})/2$**,** $h = (1-\sqrt{5})/2$
- **f(n) in** $\Theta(g^n)$
- **R(n) in** $\Theta(\sum_{j=2}^{n} \lg(g^j))$
- $\lg(g^j) = j \lg(g)$
- **R(n) in** $\Theta(\sum_{j=2}^{n} j \lg(g))$
- **R(n) in** $\Theta(\sum_{j=2}^{n} j)$
- $\sum_{j=1}^{n} j = n(n-1)/2$
- **R(n) in** $\Theta(\sum_{j=2}^{n} j) = \Theta(n^2)$