Lab 06 - Dijkstras algorithm

- find the Θ complexity for your algorithm
- $f(n)$ is $O(g(n))$ iff there exist possitive constants c, k such that $f(n) \leq c \cdot g(n)$ for all $n \geq k$

- $f(n)$ is $\Theta(g(n))$ iff there exists possitive constants c, d, k such that $c \cdot g n \leq f(n) \leq d \cdot g(n)$ for all $n \geq k$ (both $O(g(n))$ and $\Omega(g(n))$)

- $f(n)$ is $\Omega(g(n))$ iff there exist possitive constants d, k such that $d \cdot g(n) \leq f(n)$ for all $n \geq k$

Let $f(n) = 32n^2 + 3n$

Prove $f(n)$ is $O(n^2)$

$32n^2 + 3n \leq c \cdot n^2$

let $c = 32$

$32n^2 + 3n \leq 32n^2$

$3n \leq 0$

$n \geq 0$

this relationship holds true for $c = 32$ and any possitive k so $f(n)$ is $O(n^2)$.

Prove $f(n)$ is $\Omega(n^2)$

let $d = 16$

$32n^2 + 3n \geq 16n^2$

$16n^2 + 3n \geq 0$

$16n^2 \geq -3n$ n has to be positive

$16n^2 \geq 3n$ so we can divide

$16n \geq 3$

$n \geq \frac{3}{16}$

this relationship holds true for $d = 16$ and $k \geq \frac{3}{16}$ so $f(n)$ is $\Omega(n^2)$

Therefore, because $f(n)$ is both $O(n^2)$ and $\Omega(n^2)$ it is also $\Theta(n^2)$.