

NYU Computer Science Bridge HW6

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Question 5

Use the definition of θ in order to show the following:

a. $5n^3 + 2n^2 + 3n = \theta(n^3)$

Proof. Assume $n > 0$, then $5n^3 + 2n^2 + 3n \leq 5n^3 + 2n^3 + 3n^3$
 $5n^3 + 2n^2 + 3n \leq 10n^3$
 $5n^3 < 5n^3 + 2n^2 + 3n$
 $5n^3 + 2n^2 + 3n = \theta(n^3)$ ■

b. $\sqrt{7n^2 + 2n - 8} = \theta(n)$

Proof. Assume $n > 4$, then $\sqrt{7n^2 + 2n - 8} < \sqrt{7n^2 + 2n^2}$
 $\sqrt{7n^2 + 2n^2} < \sqrt{3n^2} = 3n$
and $\sqrt{7n^2 + 2n^2 - 8} > \sqrt{7n^2} = 7x$
then $\sqrt{7n^2 + 2n^2 - 8} = \theta(n)$ ■