

MATH 201 FALL 2021 GRADED HOMEWORK #3

Write clearly, on separate paper. All questions carry equal weight.

- (1) Determine the limit of the sequence

$$\left\{ \frac{6n^3 - n^2 - 4n}{5n^3 - 2n - 2} \right\}_{n \in \mathbb{N}},$$

justifying your answer.

- (2) Give a proof, by induction, of the following

Proposition. For each natural number n , the function $x^{2n} - x^n$ is continuous.

- (3) Let $\{x_n\}_{n \in U}$ and $\{y_n\}_{n \in U}$ be Cauchy sequences. Using only the definition of a Cauchy sequence, prove that $\{x_n - y_n\}_{n \in U}$ is a Cauchy sequence.