

MATH 150A-QUIZ 3, WINTER 2020

Name: _____

1. Consider the convergence of the following sequence. If convergent, compute its limit and justify your steps. If divergent, explain your reasoning.

$$\left\{ \frac{n3^n + n^2 2^n + 5n}{5^n + n^3} \right\}_{n \geq 1}.$$

Here you may directly use $\lim_{n \rightarrow \infty} n^k a^n = 0$ for any $k \in \mathbb{N}$ and any $0 < a < 1$.

2. Define a sequence by $a_1 = \sqrt{2}$ and $a_{n+1} = \sqrt{2 + a_n}$ for all $n \geq 1$. Show that $\{a_n\}$ is convergent by proving that it's monotone increasing and bounded above by 2, where you need to proceed by induction.