

**MATH 150A-QUIZ 3, WINTER 2020**

Name: \_\_\_\_\_

1. Use the class example  $e = \lim_{n \rightarrow \infty} (1 + \frac{1}{n})^n$  and the formula

$$1 + \frac{3}{n} = \left(1 + \frac{1}{n}\right) \left(1 + \frac{1}{n+1}\right) \left(1 + \frac{1}{n+2}\right)$$

to show that

$$\lim_{n \rightarrow \infty} \left(1 + \frac{3}{n}\right)^n = e^3.$$

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.