NAME AND ID NUMBER:

Problem	1	2	3	Total	Practice Midterm 2
Score					April, 2020 Total maximal score $= 30$.

Show all your work. Write proofs carefully, clearly and completely, so that they can be used, for example, to satisfy the "proof writing" Mathematics Department graduation requirement.

(1) (10 points) Suppose the sequence (x_n) is defined by

$$x_1 = 2, \ x_{n+1} = 2 - \frac{1}{x_n}$$

for n > 0. Show that (x_n) is bounded and monotone. Find the limit.

- (2) (10 points) Can you give an example of a convergent series Σx_n and a divergent series Σy_n such that $\Sigma (x_n + y_n)$ is convergent? Explain.
- (3) (10 points) Determine and prove if the following series converge or diverge:
 - (a) $\sum_{n=1}^{\infty} \frac{n+1}{3n+5}$
 - (b) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+1}$

End of Examination.