Math 431 April 20, 2018

Assignment 12
(Due April 26)

Reading: §5.6, 5.7

Problems: §5.3: #4, 5
§5.6: #3, 8, 9
§5.7: #2, 3, 5, 9

Additional Problems:

1. Solve the ODE

$$f'(t) = \frac{1}{2f(t) - 1}, \;\; f(0) = 1$$

by multiplying both sides by $2f(t)-1$ and then using FTCII (both sides will be deriatives); or use separation of variables, if you know what that is. For what t is your solution valid?

2. In the "Set-up" for Picard Iteration, let

$$F(x) = \frac{1}{2x - 1}, \;\; x_0 = 1, \;\; b = \frac{1}{2} - \eta.$$

Here $\eta < \frac{1}{2}$ is a positive number. Compute M and K, then choose b and a that satisfy the conditions there. (*Suggestion:* One way to find a Lipschitz constant K is to use the Mean Value Theorem.) For what t will the (eventual) solution $f(t) := \lim f_n(t)$ be valid? Compare this to your answer to the final question in Additional Problem 1. above.