Keep doing:

1. Going over examples in detail 16
2. "Understanding one example is better than not understanding three examples".
3. Posting notes online 14 (sometimes different? I pick one classes and post it)
4. Keep using the Doc Camera 13
5. Jokes/fun 10
6. Lots of examples 9
7. Lively/Enthusiastic 4
8. Examples For theorems 2
9. Answer Questions Clearly 2
10. Using the blue pen 2
11. Being interactive 2
12. Videos 2
13. Review previous class knowledge 1
14. Breathing 1
15. Passion 1
16. Pace 1
17. Writing big 1
18. Expand on topics 1
19. Piazza Question Demon 1
20. Approchable 1

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Stop doing:

1. Going quickly 13
2. Going to Germany 8
3. Letting substitute come in 2
4. Rushing the end of examples/class 3
5. Clicker questions 1
6. Calling out the back row 1
7. Taking so long to start the lecture 1
8. Stop waiting until (2:30/3:30) to start class 1?
9. Don't scroll too fast on the projector 1
10. Irrelevant questions 1
11. Saying "right" 1
12. Going on tangents 1
13. Skipping "Large steps" 1
14. Stealing napkins 1
15. Jumping topics 1
16. Cramming into a page 1
17. Confusing me 1
18. Giving assignments 1

Start doing:

1. Give time to solve questions before doing them 7
2. Post solutions to textbook questions 4
3. Review assignments after they're done 3 (Probably can't; see LEARN for announcements and solutions)
4. More Homework questions 3
5. More Online questions 3
6. Help with solving style 2
7. Review previous lecture 2
8. Give money 2
9. More Chalkboard work 2
10. More office hours 2
11. Harder examples/Challenge problems 2
12. Talk about the midterm/ general difficulty level 2
13. Harder Questions 2 (midterm like)
14. Review for Midterm 2
15. Reiterate the steps at the end; remind us what a theorem means 1
16. Holding Potlucks 1 (But without napkins?)
17. Give easier self examples 1
18. More examples for complex concepts 1
19. Discovery of proofs 1
20. Recommended readings 1
21. Help on how to start problems 1
22. In-class hints on assignments 1
23. Print symbols neater 1
24. More hints on Piazza (mention Socratic Method) 1
25. Organize notes better 1
26. Use a microphone 1

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27. {} 1
28. Have an introduction 1
29. More Weekly Videos 1
30. Turn off front set of lights 1
31. Bonus questions 1
32. Refer to the textbook 1
33. Make the back of the class answer more questions 1
34. Give an idea of number of points on exam (tough to do) 1
35. More Clicker Questions 1
36. Talk slower and write neater 1
37. More detailed examples 1
38. Identify what we're proving 1

Fibonacci sequence: $f_1 = 1$, $f_2 = 1$ and $f_n = f_{n-1} + f_{n-2}$ for all $n \geq 3$.

1. Prove that $\sum_{r=1}^{n} f_r^2 = f_n f_{n+1}$ for all $n \in \mathbb{N}$.

↳ $= f_1^2 + f_2^2 + \cdots + f_n^2$

PF: Use PMI

Base Case: $n=1$ LHS: $\sum_{r=1}^{1} f_r^2 = f_1^2 = 1^2 = 1$

RHS: $f_n f_{n+1} = f_1 f_2 = 1 \cdot 1 =$

LHS = RHS.

IH: Assume $\sum_{r=1}^{k} f_r^2 = f_k f_{k+1}$ for some $k \in \mathbb{N}$.

IStep: WANT $\sum_{r=1}^{k+1} f_r^2 = f_{k+1} f_{k+2}$.

$$\sum_{r=1}^{k+1} f_r^2 = \sum_{r=1}^{k} f_r^2 + f_{k+1}^2 \overset{IH}{=} f_k f_{k+1} + f_{k+1}^2 = f_{k+1}(f_k + f_{k+1}) = f_{k+1} f_{k+2}$$

Thus, $\sum_{r=1}^{k+1} f_r^2 = f_{k+1} f_{k+2}$.

Hence $\sum_{r=1}^{n} f_r^2 = f_n f_{n+1}$ for all $n \in \mathbb{N}$ by PO

2. Prove that $f_n < \left(\frac{7}{4}\right)^n$ for all $n \in \mathbb{N}$.

Exercise (see video).

Closed Form: "Easy to put into a calculator"

Ex: Find a closed form expression for

$$P_n = \prod_{r=2}^{n} \left(1 - \frac{1}{r^2}\right) \quad (n \geq 2)$$

and prove true by induction.

WAPKIW: $n=2$ $P_2 = \prod_{r=2}^{2}\left(1-\frac{1}{r^2}\right) = \left(1-\frac{1}{2^2}\right) = 1-\frac{1}{4} = \frac{3}{4}$

$n=3$ $P_3 = \prod_{r=2}^{3}\left(1-\frac{1}{r^2}\right) = \left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right) = \frac{3}{4}\cdot\frac{8}{9} = \frac{2}{3} = \frac{4}{6}$

$n=4$ $P_4 = \prod_{r=2}^{4}\left(1-\frac{1}{r^2}\right) = \left(1-\frac{1}{2^2}\right)\left(1-\frac{1}{3^2}\right)\left(1-\frac{1}{4^2}\right)$

$$= \frac{2}{3}\cdot\frac{15}{16} = \frac{5}{8}$$

Claim: $\boxed{n=5 \quad P_5 = \frac{6}{10}}$ Claim: $P_n = \frac{n+1}{2n}$