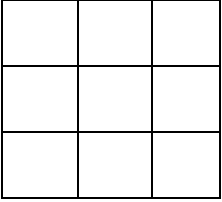
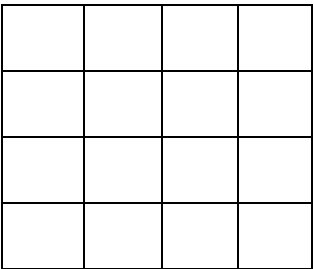


[Problem 2.1] (20 min)

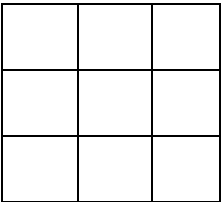
(i) How many squares are in the diagram below?



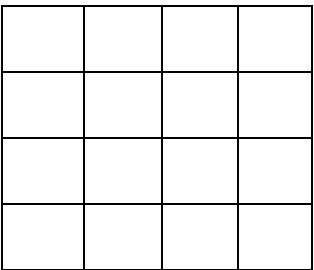
(ii) How about now?



(iii) How many rectangles are in the diagram below?



(iv) [CHALLENGE] How about now?



[Problem 2.2] (20 min)

(i) List all the prime numbers that are less than 20.

(ii) Is the number 324 prime? Why or why not?

(iii) Is the number 1617 prime? Why or why not?

(iv) [CHALLENGE] Can you come up with a clever way to list all the prime numbers that are less than 100? What about 1000?

(v) [CHALLENGE] How many prime numbers are there? How do you know?

[Problem 2.3] (20 min)

(i) Evaluate the nested fraction $\frac{1}{2/3}$

(ii) Evaluate the nested fraction $\frac{1/2}{2/3}$

(iii) [CHALLENGE] Evaluate the nested fraction $\frac{1}{\frac{2/3}{3/9}}$

(iv) [CHALLENGE] Evaluate the nested fraction $\frac{1/2}{\frac{3/4}{\frac{3/2}{3/4}}}$

[Problem 2.4] (30 min)

Let's play a game. You and your partner each pick a number between 1 and 100 and write it down on a sheet of paper without showing your partner. You put the paper face-down, and you and your partner try to guess each other's number. Each time you make a guess, your partner will tell you whether you got the number right, or if you didn't, then if your guess was too high or too low.

(i) Play a few rounds of the game.

(ii) What is the best strategy to win this game?

(iii) [CHALLENGE] Using this strategy, what is the largest number of guesses it could possibly take you to guess your partner's number?