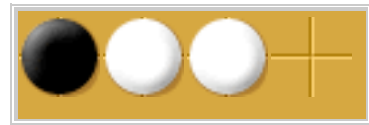


CAPTURES

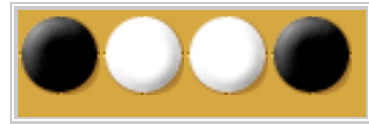
Whenever your opponent has two stones (and only two) which are adjacent, those stones are vulnerable to capture. The pair can be captured by bracketing its two ends with your own stones. The captured stones are removed from the board.

Captures can be made vertically, horizontally, or diagonally, and multiple captures can occur on a single move.

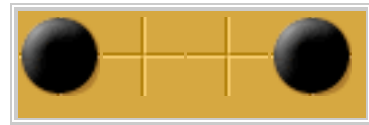
To capture stones



bracket your opponent



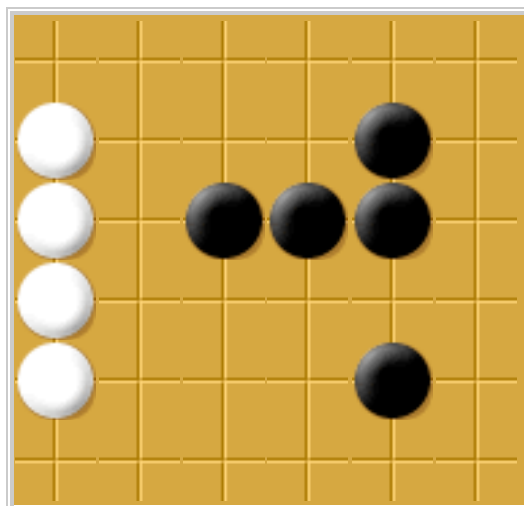
and remove the pair.



WINNING THE GAME:

The game ends immediately when one player places five stones in a row or captures five pairs of opponents stones. The opposing player has no "last chance" to make a final move.

When a player obtains an unblocked row of four stones, called a *tessera*, a win is imminent. Therefore, an unblocked row of three stones, called a *tria*, is a serious threat that should be blocked unless a stronger offensive move exists. An unblocked row of three stones, if it contains one gap, is still considered a *tria*. In the example below, black has formed a *tria*, while white has formed a *tessera* and will win with the next move.



TASKS.

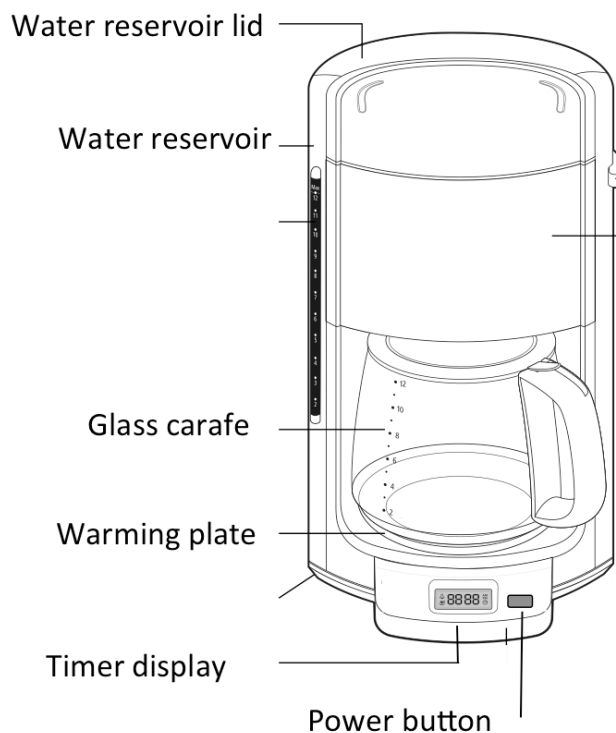
- Write a scenario for the first five moves of a Pente game (text only, at least five steps in the scenario, including primitive UI description). Include in this scenario the situation where the black player makes a capture [10 points]

- b. Write a scenario (text only, at least 3 steps) starting from the state in the figure above (where white has formed a *tessera*) and ends when the white player has won the game [6 points]
- c. Derive a class model from storyboard scenarios documented previously. The class model should include attributes as well as methods. [14 points]

Note: Steps of the scenarios should be written in detail covering all important aspects of the described situation. You can choose any target device: desktop, tablet, smartphone, etc.

QUESTION 2. Coffee Machine [20 points]

You are required to specify the controller of a coffee machine as a statechart diagram.



The key components of the coffee machine are:

1. A single power on/off button,
2. A water reservoir with level sensor (with capacity of up to 2 liters),
3. A warming plate with a weight sensor and a presence sensor (to detect if the carafe is placed on it and the weight inside the carafe),
4. An ergonomic glass carafe with capacity of 1500 ml, and
5. A programmable auto-off timer (for the sake of brevity, we will assume that the function “auto-off timer programming” is specified elsewhere –and not by you. Therefore, we will assume that the auto-off timer is set to 2 hours).

The operation of the coffee machine is as follows. The coffee machine starts operating when the user presses the power button. If the water reservoir is not empty and the carafe is on the warming plate, the coffee machine starts making coffee (i.e. warming up the water in the reservoir). The coffee machine stops making coffee whenever one of the following happens:

1. The carafe contains approx. 1500 ml of coffee, as sensed by the weight sensor (we assume that the weight sensor reports the weight in millilitres based on an approximate conversion from grams to millilitres).
2. the water reservoir is empty (sensed by the level sensor), or
3. the carafe is removed from the warming plate (sensed by the presence sensor).

The warming plate will operate as long as the carafe is on it. However, for safety reasons the warming plate must be turned off when:

- 1) the water reservoir is empty (sensed by the level sensor),
- 2) the carafe contains less than 100 ml (sensed by the weight sensor), or
- 3) the carafe is removed from the warming plate (sensed by the presence sensor).

When the user returns the carafe to the warming plate, the coffee machine resumes its operation in the state it was before removing the carafe (e.g. either coffee making or warming-only). Since the status of the components of the coffee machine might have been changed while the carafe was out of the warming plate (e.g. the carafe is empty when it is put back into the warming plate), it is important to periodically monitor the state of the components of the coffee machine (e.g. amount of water in the reservoir, amount of water in the carafe, etc.)

The coffee machine is automatically turned off after 2 hours of operation or when the carafe has been removed from the warming plate for more than 5 minutes.

Finally, the user can manually turn the coffee machine off by keeping pressed the power button for at least 2 seconds. (Hint: you can consider that the power button generates two events: buttonPressed and buttonReleased).

Use the following statechart as the starting point for your solution:

