1. Write a class that captures the 2-dimensional position and orientation of a player in a game.
2. Write a class that captures the 2-dimensional velocity and steering for a player figure in a game.
3. A simple game has characters move at a single velocity or stand still. Assume that the player is located at position (5100,1200), is currently moving at speed 30 per second with velocity (25,17). This game updates velocity every second. Assume that an enemy appears at position (5200,1310) and the character initiates fleeing from the enemy.
   a. What is the steering vector of length 20?
   b. What is the new velocity? (Remember that the maximum speed is 30.)
4. You are part of developing a massive multi-player game with a very large number of AI controlled characters. In one of the levels, a chasm allows sometimes players to jump over it. Discuss the strategies for implementing jumps over the chasm.
5. A game uses a 90° cone of length 100 in order to trigger collision avoidance behavior with another game character. Write (pseudo-)code for the triggering mechanism, but not the actual avoidance behavior. Assume that the velocity of your character is given by a vector \( \mathbf{v} \), the position of your character by \( \mathbf{x} \) and the position of a possibly colliding character by \( \mathbf{y} \).
   (Hint: the angle \( \alpha \) between two vectors \( \mathbf{a} \) and \( \mathbf{b} \) satisfies \( \cos(\alpha) = \frac{\mathbf{a} \cdot \mathbf{b}}{|\mathbf{a}| \cdot |\mathbf{b}|} \))
6. Explain the “corner trap” for obstacle avoidance behavior. Assume that the character uses two rays in order to avoid obstacles.
7. In a game, a car is currently located at position (1200, 2000) and seeks to accelerate towards an object at (500, 3000). The car is currently oriented along the vector (0,1). Assume that motor control allows the car’s acceleration to have a lateral component up to 5% of the component in the direction of its orientation and limits the total acceleration to a value of 50. Calculate the new acceleration.
We are coloring a simplified map of Latin America (a border and a country is missing) with the three colors red, green and blue. The current node reflects assignment to the shaded nodes.

a. Use forward checking on the remaining variables.

b. Check for arc consistency on the remaining variables. (Show each step.)