Solution: a game where the player shoots a missile at ships passing across the screen

1) <precondition> <action> <postcondition> -- Corie Rivers, David Alsobrooks, Laynie Jaramillo

The solution must support missiles launched by the user

a) The solution must initiate a missile launch when the user clicks the right mouse button.
    i) Happy Path
    ii) <precondition>: Game is running, number of active missiles on the screen is less than five (5).
    iii) <action>: Right mouse button is clicked.
    iv) <postcondition>: Game is running, missile launch is initiated, number of active missiles on the screen is less than or equal to 5.
    v) Unhappy Path
    vi) <precondition>: Game is running, number of active missiles on the screen is equal to 5.
    vii) <action>: Right mouse button is clicked.
    viii) <postcondition>: Game is running, missile launch is not initiated.
b) The solution must initiate a missile launch when the user clicks the space bar.
    i) Happy Path
    ii) <precondition>: Game is running, number of active missiles on the screen is less than 5.
    iii) <action>: Space bar is clicked.
    iv) <postcondition>: Game is running, missile launch is initiated, number of active missiles on the screen is less than or equal to 5.
    v) Unhappy Path
    vi) <precondition>: Game is running, number of active missiles on the screen is equal to 5.
    vii) <action>: Space bar is clicked.
    viii) <postcondition>: Game is running, missile launch is not initiated.
c) The solution must limit the number of active missiles on the screen to no more than five (5) at any given time. (an “active missile” is any missile currently being displayed on the screen)
    i) Happy Path
    ii) <precondition>: Game is running, number of active missiles on the screen is equal to 5.

iii) <action>: Either space bar or right mouse button is clicked.
iv) <postcondition>: Game is running, missile launch is not initiated.
v) Unhappy Path
vi) <precondition>: Game is running, number of active missiles on the screen is less than 5.
vii) <action>: Either space bar or right mouse button is clicked.
viii) <postcondition>: Game is running, missile launch is initiated, number of active missiles on screen is less than or equal to 5.

d) The solution must remove the missile from being active if it goes off the screen.
   i) Happy Path
   ii) <precondition>: Game is running, missile is active & on screen, number of active missiles is less than or equal to 5.
   iii) <action>: Missile moves off screen.
   iv) <postcondition>: Game is running, number of active missiles is decremented by 1.
   v) Unhappy Path
   vi) <precondition>: Game is running, 2 or more missiles are active & on screen, number of active missiles is less than or equal to 5
   vii) <action>: 2 or more (we'll say X for the exact amount) active missiles move off screen simultaneously.
   viii) <postcondition>: Game is running, number of active missiles is decremented by X.

e) The solution must maintain the same constant speed for all missiles
   i) Happy Path
   ii) <precondition>: Game is running, missile launch is successfully initiated.
   iii) <action>: Missile moves X distance (named variable in code) in one frame (or other used unit of time).
   iv) <postcondition>: Missile moves X distance in every following frame, until it is no longer active.
   v) Unhappy Path
   vi) <precondition>: Game is running, 1-4 missiles are active, missile launch is successfully initiated.
   vii) <action>: Missile moves X distance in one frame (or other used unit of time).

viii) <postcondition>: Game is running, all missiles move X distance in every following frame, each moving at that static speed until they leave the screen.

f) The solution must launch missiles from the center of the bottom of the screen when a launch is initiated.
   i) Happy Path
   ii) <precondition>: Game is running, number of active missiles on the screen is less than 5.
   iii) <action>: Either space bar or right mouse button is clicked.
   iv) <postcondition>: Game is running, missile launch is initiated in the center of the bottom of the screen, number of missiles on screen is less than or equal to 5.
   v) Unhappy Path
   vi) <precondition>: Game is running, number of active missiles on the screen is equal to 5.
   vii) <action>: Either space bar or right mouse button is clicked.
   viii) <postcondition>: Game is running, missile launch is not initiated.

g) The solution must maintain the same constant direction for all missiles to be vertically straight up from the launched position.
   i) Happy Path
   ii) <precondition>: Game is running, missile launch is successfully initiated.
   iii) <action>: Missile moves in a straight line vertically upward for the first frame (or other used unit of time)
   iv) <postcondition>: Game is running, missile continues to move in the same straight upward line until it is no longer active.
   v) Unhappy Path
   vi) <precondition>: Game is running, 1-4 missiles are active, missile launch is successfully initiated.
   vii) <action>: Missile moves in a straight line vertically upward for the first frame (or other used unit of time)
   viii) <postcondition>: Game is running, all missiles move in the same straight line vertically upward until they are no longer active.

h) The solution must detect when a missile “hits” a ship.
   i) Happy Path
   ii) <precondition>: Game is running, active missile X and active ship Y are both on screen.
   iii) <action>: X and Y move onto the same location at the same time.

iv) <postcondition>: Collision detected between X and Y
v) Unhappy Path
vi) <precondition>: Game is running, active missile X and active ship Y are both on screen
vii) <action>: X and Y move close to each other, but not at the exact same location at the same time.
viii) <postcondition>: Collision not detected between X and Y

i) The solution must display an explosion at the point where a missile "hits" a ship.
   i) Happy Path
   ii) <precondition>:
   iii) <action>: ship is assigned a "hit" marker to it
   iv) <postcondition>: "explosion" is displayed to the screen showing that the ship was hit
   v) Unhappy Path
   vi) <precondition>:
   vii) <action>: ship is assigned a "hit" marker to it
   viii) <postcondition>: solution fails to display the "explosion" to the user
j) The solution must remove the missile and ship after the missile "hits" the ship.
   i) Happy Path
   ii) <precondition>: Missile and ship are visible
   iii) <action>: missile collides with ship
   iv) <postcondition>: missile and ship both disappear
   v) Unhappy Path
   vi) <precondition>: missile and ship are visible
   vii) <action>: no collision happens
   viii) <postcondition>: both missile and ship are still visible
k) The solution must keep a count of all "hits."
   i) Happy Path
   ii) <precondition>: hit counter has an integer variable stored
   iii) <action>: ship is struck
   iv) <postcondition>: hit counter variable is decremented
   v) Unhappy Path
   vi) <precondition>: hit counter has an integer variable stored
   vii) <action>: no ships have been hit
   viii) <postcondition>: hit counter does not decrement

2) The solution must support ships launched by the solution

a) The solution must initiate a ship launch when the system detects there are no active ships.
    i) Happy Path
    ii) <precondition>: no active ships
    iii) <action>: initiate a ship launch
    iv) <postcondition>: there is now an active ship
    v) Unhappy Path
    vi) <precondition>: there are active ships
    vii) <action>: no ship launches initiated
    viii) <postcondition>: no new ships have been created
b) The solution must support multiple types of ships based on a configuration value
    i) Happy Path
    ii) <precondition>: There is a configuration value
    iii) <action>: System supports multiple ship types based on the config value
    iv) <postcondition>: multiple ship types are supported
    v) Unhappy Path
    vi) <precondition>: No config value
    vii) <action>: default # set for ship types
    viii) <postcondition>: default # of ships are supported
c) The solution must display the appropriate image based in the type of ship when the ship is active
    i) Happy Path
    ii) <precondition>: ship is active and has a specified type
    iii) <action>: ship becomes active
    iv) <postcondition>: appropriate image is displayed
    v) Unhappy Path
    vi) <precondition>: ship is not active and has a specified type
    vii) <action>: ship is not made active
    viii) <postcondition>: image is not displayed
d) The solution must randomly initiate a ship launch based on a configuration rate where the default is 30% of the time.
    i) Happy Path
    ii) <precondition>: configuration value is specified
    iii) <action>: ships are launched based off value
    iv) <postcondition>: there are a random amount of ships on screen at
    v) Unhappy Path

vi) <precondition>: There is no config value specified
vii) <action>: ships are launched based off default value
viii) <postcondition>: ships are launched 30% of the time randomly

i) The solution must randomly choose from available ship types when a launch is initiated, giving all ship types equal chance of being launched.
    a. Happy Path
    b. <precondition>: there are random ship types to choose from with an equal chance of any being chosen
    c. <action>: a random ship type is chosen
    d. <postcondition>: random ship type has been assigned
    e. Unhappy Path
    f. <precondition>: there are ship types, but selection method is not random
    g. <action>: ship type is chosen
    h. <postcondition>: ship type has been assigned with a tendency towards certain ship types

ii) The solution must limit the number of active ships on the screen to no more than ten (10) at any given time. (an “active ship ” is any ship currently being displayed on the screen)
    a. Happy Path
    b. <precondition>: there are 10 ships on screen
    c. <action>: ship activization is temporarily suspended
    d. <postcondition>: no ships are fired until one disappears
    e. Unhappy Path
    f. <precondition>: there are less than 10 ships on screen
    g. <action>: ship activization is unaffected
    h. <postcondition>: ships fire as normal

iii) The solution must randomly choose a location to launch a ship from when initiated
    a. Happy Path
    b. <precondition>: ship is about to be launched
    c. <action>: random location is picked
    d. <postcondition>: ship is launched at random location
    e. Unhappy Path
    f. <precondition>: ship is not about to be launched
    g. <action>: no location is chosen
    h. <postcondition>: no ship is launched

1. The system must randomly choose to launch the ship from the left side of the screen or the right side of the screen
    a. Happy Path
    b. <precondition>: Ship is set to be launched
    c. <action>: side of screen is seleected
    d. <postcondition>: ship appears randomly from either left or right side of the screen
    e. Unhappy Path
    f. <precondition>: No ship is set to be launched
    g. <action>: No side of screen is selected
    h. <postcondition>: Ship is not launched
2. The system must randomly choose a row in the top two-thirds of the screen to launch the ship from
    a. Happy Path
    b. <precondition>: ship is set to be launched
    c. <action>: row of screen is selected
    d. <postcondition>: ship is launched
    e. Unhappy Path
    f. <precondition>: no ship is set to be launched
    g. <action>: no row is selected
    h. <postcondition>: no ship is launched
3. The system must assign the speed of the ship based on the type of the ship being initiated
    a. Happy path
    b. <precondition>: ship is set to be launched
    c. <action>: speed of ship is randomly selected
    d. <postcondition>: ship is launched at selected speed
    e. Unhappy Path
    f. <precondition>: system has set speeds assigned to ship types
    g. <action>: systems with assign the speed
    h. <postcondition>: fails to assign the correct speed to correct ship
4. The system must assign the direction of the ship based on which side of the screen it is being launched from (if from the left, direction goes left to right; if from the right, direction goes right to left)
    a. Happy Path
    b. <precondition>: game is ready to launch the ship from a chosen side (left side)

c. <action>: ship is launched from the left side of the screen
d. <postcondition>: the ship is set to go left to right
e. Unhappy Path
f. <precondition>: game is ready to launch the ship from a chosen side (left side)
g. <action>: game launches the ship from the left side
h. <postcondition>: ships move from left to right

e) The solution must remove the ship from being active if it goes off the screen
   i) <precondition>: the ship is on the screen
   ii) <action>: ship exits the screen
   iii) <postcondition>: solution removes the ship as an "active"
   iv) <precondition>: the ship is on the screen
   v) <action>: ship exits the screen
   vi) <postcondition>: solution fails to remove as an active, keeps the ship

3) The solution must end the game when the "hit" count has reached ten (10)
   a) <precondition>: hit count <= 9
   b) <action>: "hit" reaches 10 ten hits
   c) <postcondition>: solution ends the game
   i) <precondition>: hit count <= 9
   ii) <action>: hit is made, does not increment properly
   iii) Game continues with hits succeeding 10
4) The solution must end the game when the user clicks the left mouse button
   a) <precondition>: the game is running
   b) <action>: user elects to click the left mouse button
   c) <postcondition>: the game ends
   i) <precondition>: the game is running
   ii) <action>: user clicks the left button
   iii) <postcondition>: doesn't respond, action ignored, game continues
5) The solution must end the game when the user clicks the escape button
   a) <precondition>: the game is running
   b) <action>: the user initiates button pushes to escape the game
   c) <postcondition>: game end
      i) <precondition>: the game is running
      ii) <action>: user clicks the escape button
      iii) <postcondition>: only parts of the game shuts down, other visuals, sounds, etc., continue
6) The solution must end the game if the user has not initiated a missile launch in the last 5 minutes

a) <precondition>: the game is running
b) <action>: the user has not initiated a missile launch in the last 5 minutes (5 minutes have passed)
c) <postcondition>: the game ends
    i) <precondition>: the game is running
    ii) <action>: user has not launched a missile in the past 5 minutes
    iii) <postcondition>: the game continues, delayed shut down time longer than 5 minutes.