**Additional Context on Data Definitions**

**Period:** {1,2,3,4}  A hockey game normally consists of three 20-minute periods: 1,2,3.  If a game is tied after three periods, it will go into overtime (period 4).

**Home Team Skaters x/ Away Team Skaters y**: where x and y = {3,..,6}.  This refers to the number of skaters each team has on the ice when a play is made (not counting goalies).  Normally each team has 5 skaters (corresponding to "5 on 5" situation).  However, when a team commits a penalty, a player is sent off (normally for 2 minutes). Thus, if a home team commits a penalty the situation will change from "5 on 5" to "4 on 5".  If they commit another penalty they will lose another skater, leading to "3 on 5".  At most two players can be taken off due to penalties (thus "2 on 5" is not possible).  Also a team may choose to replace their goalie with an extra skater (this is normally done when a team is losing at the end of the game and needs a goal to pull even).  In this case the team has 6 skaters on the ice leading to a "6 on 5" situation.  Finally, during overtime (period=4) teams play with three skaters each ("3 on 3"). Note that while players will rotate during most of the game, only certain players will typically be used during penalty situation.  If a team has an advantage (e.g., a "5 on 4" situation), this is called a "power play" and certain players specialising in power play will be fielded.  If the team is at a disadvantage (e.g., "4 on 5"), this is called a "penalty kill" and penalty kill specialists will usually be used. These specialist roles are not prescribed by the rules - theoretically any player can be used in any situation.

**Events:** this describes a certain "play" situation in the game.  There are the following event types in the data:

* Shots and Goals:
  + The object of the game is to score goals. A goal involves a “shot” - a player “shooting a puck” (i.e., striking the puck with a stick) towards the net.
  + The vast majority of shots are unsuccessful – they either miss the net (“missed”), are blocked (intercepted) before they get to the net (“blocked”) or reach the net only to be saved (intercepted) by the goalie (“on net”). Shots that are successful (a puck enters the net) are classified as “goal” events.
  + Shot types: these refer to different ways a player may shoot the puck towards the net
    - Deflection: the player uses the stick to deflect a moving puck towards the net; no active shooting motion involved
    - Snapshot, Slapshot, Wristshot: these are three different shooting technique. They differ in the time it takes to execute a shot, the speed of the shot, and the trajectory of the puck. Some players are particularly skilled in one type of a shot.
    - Fan: a failure to execute a shot; the player attempted to shoot the puck but the stick missed the puck either completely or partially
    - Wrap-around: a special shot where the player positioned behind the net reaches out with the stick and attempts place the puck in the net
  + One-time shot: the only contact between the player and the puck is the actual shot. Such shots are rare: normally the player first hast to gain control of the puck (either by bringing it into the offensive zone or by receiving a pass from another player). In either case, there will be multiple contacts with the puck prior to the shot, in which case the shot is NOT a “one-time”.
  + Traffic: an indicator whether there were other players (from either team) between the shooting player and the goalie at the time of the shot. A shot made through traffic is harder to aim and has a high chance of being blocked. However, it is also much harder for the goalie to see and thus may have a higher chance of being successful.
* Play and Incomplete Play: refers to an attempted pass; the player handling the puck ("passer") attempts to pass it to the target player ("Player 2"). An unsuccessful pass (that does not reach its intended target) is classified as an Incomplete Play.
  + “Direct” pass: the puck travels from the stick of the passer to the stick of the target (since sticks have a bit of tape on the end to assist in puck handling, a direct pass is also known as “tape-to-tape”).
  + “Indirect” pass: the puck is bounced off the boards (surrounding the hockey rink) prior to reaching the target
* Takeaway: a play that results in the change of possession of the puck
  + Prior to this play the puck is controlled by one team
  + After the play the control goes to the other team
  + A takeaway may happen as a result of a “steal” (a puck is taken directly from the player controlling it), an intercepted pass, a hit, etc.
* Puck Recovery:
  + Change of possession initiated by retrieving a loose puck that was created by a missed/blocked/saved shot, an advance (e.g. dump-out/dump-in), a faceoff or a “broken play” (e.g. intended target of the pass never arrived)
* Dump In/Out:
  + A very common play in hockey where a skater intentionally concedes possession by advancing the puck up ice.
  + “Dump In”: occurs on offense when the puck if thrown into the zone of the opposing team with the intention of hitting an opponent who attempts to gain control of the puck and thus re-gaining the possession in a more advantageous position
  + “Dump Out”: occurs on defense when the skater throws the puck out of their own zone in an attempt to reduce the offensive pressure and gain time while the offensive team regains control of the puck
* Zone Entry:
  + The skater attempts to bring the puck into the offensive zone overcoming the actions of the defender who typically attempts to prevent zone entry
  + This play is based on an important rule in hockey that the puck cannot be passed directly from the teams defensive zone to an offensive zone (see diagram below) – it must be touched by a skater (from either team) in the neutral zone. Since goals can (realistically) only be scored from a relatively close range, i.e. from within the offensive zone, this means that in order to set up an offensive play (a pass in the offensive zone or a shot) the team must first bring the puck to the offensive zone. This can either be done via a pass (passer in the neutral zone, target player in the offensive zone) or via a Zone Entry play
* Faceoff:
  + Puck is thrown on the ice by the referee between two players from the opposing teams.  Each player attempts to gain control of the puck or pass it to a teammate
  + Faceoffs happen at numerous times during the game, typically due to zone entry violations, but also after goals are scored, at the start of each period, or after the play is stopped by the referee for any reason.
* Penalty Taken:
  + Penalties are assessed for a variety of rule violations (e.g., various illegal hits, hitting the opposite player with the stick, fighting, etc.).
  + As a result of the penalty, the offending player is sent off the ice (to the special area called the “penalty box”) for a specified length of time, where the latter depends on the nature of the penalty. Most penalties result in player removal for 2 minutes, some may be longer (5 minute or even removal for the remainder of the game).
  + As a result of the typical penalty, one of the teams ends up with a smaller number of skaters (typically four, however two consecutive or simultaneous penalties may bring the number down to three) and has to go on defense (called a “penalty kill”) while the other team goes on offense (called a “power play”). The probability of a goal during the power play is typically much higher than during the regular game situation where both teams have equal numbers of skaters on the ice.
  + Due to the importance of power plays and penalty kills, the teams typically filed special groups of skaters: power play and penalty kill “specialists”.
  + After a penalty is called, the play is restarted with a face-off

**Hockey Rink Diagram**

? Professor said the coordinate in dataset is fixed. he graph of offensive & defensive zone is true for the team on the right side. Is this team a home team or an away team ?

How to tell which team plays at which side of the arena? Is it the right side=home team, leftside=away team, or the location keep changing? If location keep changing, what is the patern?

