Problem 1

$$type\_list \leftarrow \Pi_{type\_id}(game\_type)$$

$$completed \leftarrow \Pi_{person\_id,person\_name,type\_id}(geezer \bowtie game\_score \bowtie game)$$

$$completed \div type\_list$$

Problem 2

$$person\_count \leftarrow_{type\_id} \mathcal{G}_{count-distinct(person\_id) \text{ as } person\_count}(game \bowtie game\_score)$$

$$\Pi_{game\_id,type\_id,type\_name,person\_count}(game\_type \bowtie game \bowtie person\_count)$$

Problem 3

$$game\_score \leftarrow game\_score - \sigma_{type\_name=\text{“pinochle”}}(\Pi_{game\_id,person\_id,score}(game\_type \bowtie game\_score))$$

$$game \leftarrow game - \sigma_{type\_name=\text{“pinochle”}}(\Pi_{game\_id,type\_id,game\_date}(game\_type \bowtie game))$$

$$game\_type \leftarrow game\_type - \sigma_{type\_name=\text{“pinochle”}}(game\_type)$$

Problem 4

$$works \leftarrow \Pi_{game\_id,person\_id,(score+30)}(\sigma_{person\_name=\text{“Ted Codd”}}(game\_score \bowtie geezer)) \cup$$

$$\Pi_{game\_id,person\_id,score}(\sigma_{person\_name!=\text{“Ted Codd”}}(game\_score \bowtie geezer))$$

Problem 5

$$new\_game\_id \leftarrow \Pi_{(game\_id+1)}(\mathcal{G}_{max(game\_id) \text{ as } game\_id}(game))$$

$$insert\_type\_id \leftarrow \Pi_{type\_id}(\sigma_{type\_name=\text{“dominoes”}}(game\_type))$$

$$game \leftarrow game \cup (new\_game\_id \times insert\_type\_id \times \{('2012-01-15\ \ 15:30:00.000')\})$$

$$game\_score \leftarrow game\_score \cup (new\_game\_id \times \{(987)\} \times \{(332)\})$$

$$game\_score \leftarrow game\_score \cup (new\_game\_id \times \{(227)\} \times \{(457)\})$$

Problem 6

$$person\_counts \leftarrow_{game\_id} \mathcal{G}_{count-distinct(person\_id) \text{ as } person\_count}(game\_score)$$

$$\Pi_{game\_id}(\sigma_{(person\_count \text{ IS NULL }) \vee (person\_count < min\_players) \vee}$$

$$_{(max\_players \text{ IS NOT NULL } \wedge person\_count > max\_players)}((game\_type \bowtie game) \rtimes person\_counts))$$

Problem 7

$$game\_counts \leftarrow_{person\_id,type\_id} \mathcal{G}_{count-distinct(game\_id) \text{ as } num\_times}(game \bowtie game\_score)$$

$$max\_counts \leftarrow_{type\_id} \mathcal{G}_{max(game\_count) \text{ as } max\_count}(game\_counts)$$

$$max\_people \leftarrow \sigma_{num\_times=max\_count}(game\_counts \bowtie max\_counts)$$

$$\Pi_{person\_id,person\_name,type\_id,type\_name,num\_times}(geezer \bowtie game\_type \bowtie max\_people)$$