DBS Hw 1

Question 1

Question a

```
T1 = project_{classcode, instructorname, email} (select_{instructorname =
'Fogg'} (Teaches))
T2 = select_{examdate > '11-01-2020'} (Exams)
Result = project_{classname, examname, examdate} (T1 * T2 * Classes)
```

Question b

```
Result = project_{classcode, dayofweek, starttime} (Classmeetings)) *
(project_{classcode, dayofweek, starttime} (Officehours)
```

Question c

```
Result = project_{classcode, classname} ((select_{dayofweek='Monday'}
(Classmeetings)) * Classes)
```

Question d

```
T1 = project_{classcode} (select_{semester = 'Fall', year = '2000'}
(Classes))
T2 = project_{sitename} ((select_{resourcetype = 'hw'} (Resources)) * T1)
Result = project_{username, bestbrowser} (Sites * T2)
```

Question e

```
Result = (project_{sitename} (Classmeetings)) union (project_{sitename}
(Exams)) union (project_{sitename} (Officehours)) union (project_{sitename}
(Resources))
```

Question f

```
T1 = project_{classcode, sitename} Classmeetings
T2 = project_{classcode, sitename} Exams
```

```
T3 = project_{classcode, sitename} Officehours
T4 = project_{classcode, sitename} Resources
T5 = T1 union T2 union T3 union T4
T6(classcode6, sitename6) = T5
T7 = project_{classcode6, classcode} (select_{classcode <> classcode6} (T6
x T5))
T8 = project_{classcode6, classcode} (select_{classcode6 <> classcode and
sitename = sitename6 } (T6 x T5))
Result = T7 - T8
```

Question g

```
T1 = project_{classcode, classname, instructorname} (Classes * Teaches)
T2(classcode2, classname2, instructorname2) = T1
T3(classcode3) = project_{classcode} (select_{classcode = classcode2 and
instructorname <> instructorname2} (T1 x T2))
Result = project_{classcode, classname} (select_{classcode <> classcode3}
(Classes x T3))
```

Question h

```
T1 = (select_{dayofweek <> 'Monday' and dayofweek <> 'Wednesday'}
(Officehours))
T2 = project_{classcode} (select_{semester = 'Fall', year = '2000'}
(Clesses))
Result = project_{classcode, starttime, duration} (T1 * T2)
```

Question 2

Question 1

Keys

```
ABC
```

BCNF

Not satisfied, because

- `AC -> DE` is not trival and `AC` is not a superkey
- `BD -> F` is not trival and `BD` is not a superkey

3NF

Not satisfied, because

- `AC -> DE` is not trival, `AC` is not a superkey, and `DE` are not prime attributes
- `BD -> F` is not trival, `BD` is not a superkey, and `F` is not prime attribute

Question 2

keys

```
ABC, BCD
```

BCNF

Satisfied, because

- `ABC -> DEF` is not trival and `ABC` is a superkey
- `AB -> A` is trival
- `BCD -> AEF` is not trival and `BCD` is a superkey

3NF

Satisfied, because BCNF is satisfied

Question 3

keys

```
BC
```

BCNF

Satisfied, because

- `ABC -> DE` is not trival and `ABC` is a superkey
- `BC -> AF` is not trival and `BC` is a superkey

3NF

Satisfied, because BCNF is satisfied

Question 4

keys

```
ABC, BDC
```

BCNF

Not Satisfied, because

- `BD -> A` is not trival and `BD` is a not a superkey

3NF

Satisfied, because

- `ABC -> DEF` is not trival and `ABC` is a superkey
- `BD -> A` is not trival and `BD` is not a superkey, but `A` is a prime attribute