

1. $\{ \text{num}, \text{name} \mid \exists C_1, C_2, t_1, t_2, s_1, s_2, g_1, g_2$
 $\text{student}(\text{num}, \text{name}, 2) \wedge$
 $\text{mark}(\text{num}, C_1, t_1, s_1, g_1) \wedge$
 $\text{mark}(\text{num}, C_2, t_2, s_2, g_2) \wedge$
 $(C_1 \neq C_2) \wedge (g_1 < 65) \wedge (g_2 < 65) \wedge$
 $\text{courseyeardept}(C_1, 1, 'CS') \wedge$
 $\text{courseyeardept}(C_2, 1, 'CS') \}$

2. $\{ P_{\text{num}}, P_{\text{name}} \mid \exists O, t, \text{sec}, s, c, g,$
 $\text{professor}(P_{\text{num}}, P_{\text{name}}, O, 'CS') \wedge$
 $\text{class}('CS348', t, \text{sec}, P_{\text{num}}) \wedge$
 $\text{mark}(s, 'CS348', t, \text{sec}, g) \wedge$
 $g < 60 \}$

3. $\{ P_{\text{num}}, P_{\text{name}} \mid \exists O, t, \text{sec}, s, g$
 $\neg \text{professor}(P_{\text{num}}, P_{\text{name}}, O, 'PM') \wedge$
 $\text{class}('CS245', t, \text{sec}, P_{\text{num}})$
 $\neg \text{mark}(s, 'CS245', t, \text{sec}, g) \}$

4. $\{ S_{\text{num}}, S_{\text{name}} \mid \exists t_1, t_2, s_1, s_2$
 $\text{student}(S_{\text{num}}, S_{\text{name}}, 4) \wedge$
 $\neg \text{enrollment}(S_{\text{num}}, 'CS348', t_1, s_1) \wedge$
 $\neg \text{enrollment}(S_{\text{num}}, 'CS240', t_2, s_2) \}$

5. $\{ P_{\text{num}}, P_{\text{name}} \mid \exists O, t_1, s_1, t_2, s_2$
 $\text{professor}(P_{\text{num}}, P_{\text{name}}, O, 'CS') \wedge$
 $\neg \text{class}('CS348', t_1, s_1, P_{\text{num}}) \wedge$
 $\neg \text{class}('CS234', t_2, s_2, P_{\text{num}})$

year.

6. $\{Snum, Sname \mid \exists t_1, t_2, sec_1, sec_2, S, g_1, g_2$
 $mark(Snum, 'CS240', t_1, sec_1, g_1) \wedge$
 $mark(S, 'CS240', t_2, sec_2, g_2) \wedge$
 $g_1 > Max(g_2) - 5 \}$

7. $\{Pnum, Pname \mid \exists t_1, sec_1, t_2, sec_2, S_1, S_2, g_1, g_2$
 $class('CS240', t_1, sec_1, Pnum) \wedge$
 $mark(S_1, 'CS240', t_1, sec_1, g_1) \wedge$
 $mark(S_2, 'CS240', t_2, sec_2, g_2) \wedge$
 $g_1 = Max(g_2) \}$

8. $\{Snum, Sname \mid \exists y, t, S, Pnum, Pname, O, t_2, S_2$
 $student(Snum, Sname, y) \wedge (y \geq 2) \wedge$
 $\forall C_1 = 'CS\%', C_2$
 $mark(Snum, C_1, t, S, g) \wedge$
 $g \geq 85 \wedge$
 $\neg professor(Pnum, Pname, O, 'Co')$
 $\wedge class(C_2, t_2, S_2, Pnum)$
 $\wedge enrollment(Snum, C_2, t_2, S_2) \}$

9. $\{P_1/P_2 \mid \exists Pnum1, Pnum2, Pname1, Pname2, O_1, O_2$
 $P_1 = count(Professor(Pnum1, Pname1, O_1, 'Math'))$
 $P_2 = count(Professor(Pnum2, Pname2, O_2, 'CS'))$
 $\exists C_1, C_2, t_1, t_2, sec_1, sec_2, S_1, S_2$
 $class(C_1, t_1, sec_1, Pnum1) \wedge$
 $class(C_2, t_2, sec_2, Pnum2) \wedge$
 $\exists g_1, g_2$
 $mark(S_1, C_1, t_1, sec_1, g_1) \wedge$
 $g_1 < 65 \wedge$
 $mark(S_2, C_2, t_2, sec_2, g_2) \wedge$
 $g_2 < 65$

10. $\{Pnum, Pname, Cnum, Cterm, Csection, Cname, g_1, g_2\}$

$\exists O, t, S_1, S_2$

professor (Pnum, Pname, O, 'CS') \wedge

class (Cnum, Cterm, Csection, Pnum) \wedge

(schedule (Cnum, Cterm, Csection, 'Monday', t) \vee

schedule (Cnum, Cterm, Csection, 'Friday', t)) \wedge

$g_1 = \max(g) \text{ in } (\text{mark}(S_1, Cnum, (term, (section, g))) \wedge$

$g_2 = \min(g) \text{ in } (\text{mark}(S_2, Cnum, (term, (section, g)))$