1. {(snum, sname) | STUDENT(snum, sname, 3) $\wedge \exists$ dc1, dc2, dn1, dn2, cn1, cn2, g1, g2.
(((DEPARTMENT(dc1, dn1) $\wedge$ (dn1 = ("Computer Science" $\vee$ "Pure Math"))) $\wedge$
(DEPARTMENT(dc2, dn2) $\wedge$ (dn2 = ("Computer Science" $\vee$ "Pure Math")))) $\wedge$
(MARK(snum, dc1, cn1, —, —, g1) $\wedge$ MARK(snum, dc2, cn2, —, —, g2) $\wedge$
($\neg$(cn1 = cn2) $\vee \neg$(dc1 = dc2)) $\wedge$ ((g1 $\geq$ 90) $\wedge$ (g2 $\geq$ 90))))}

2. {(snum, sname, year) | (STUDENT(snum, sname, year) $\wedge$ (year $\geq$ 3)) $\wedge$
$\neg$(MARK(snum, "CS", "241", —, —, —) $\vee$ MARK(snum, "CS", "246", —, —, —))}

3. {(deptname) | $\exists$ dc. DEPARTMENT(dc, deptname) $\wedge \neg$(dc = "CS")
$\exists$ pn, t. (PROFESSOR(pn, —, —, dc) $\wedge$ CLASS("CS", "245", t, —, pn) $\wedge$
($\exists$ sn1, sn2, g1, g2. ENROLLMENT(sn1, "CS", "245", t, —) $\wedge$
(MARK(sn1, "CS", "348", t, —, g1) $\wedge \neg$(MARK(sn2, "CS, "348", t, —, g2) $\wedge$ (g2 > g1))))))}

4. {(room) | $\exists$ dc. $\neg$(SCHEDULE(dc, —, —, —, —, —, room) $\wedge$ (dc = $\neg$("CS" $\vee$ "CO")))}

5. {(pnum, pname, office, deptname) |$\exists$ dc. (PROFESSOR(pnum, pname, office, dc) $\wedge$ DEPARTMENT(dc, deptname)) $\wedge$
$\exists$ dc1, dc2, cn1, cn2, sec1, sec2.
($\neg$(CLASS(dc1, cn1, "FALL 2018", sec1, pnum) $\wedge$
(SCHEDULE(dc1, cn1, "FALL 2018", sec1, "Monday", t1, —) $\wedge$ (t1 < 12))) $\wedge$
$\neg$(CLASS(dc2, cn2, "FALL 2018", sec2, pnum) $\wedge$
(SCHEDULE(dc2, cn2, "FALL 2018", sec2, "Friday", t2, —) $\wedge$ (t2 > 12))))}

6. {(max, min, term, deptcode, cnum) | (deptcode = ("CS" $\vee$ "CO")) $\wedge \exists$ sn, sn1, sn2, g.
((MARK(sn1, deptcode, cnum, term, —, max) $\wedge \neg$(MARK(sn, deptcode, cnum, term, —, g) $\wedge$ (g > max)))
(MARK(sn2, deptcode, cnum, term, —, min) $\wedge \neg$(MARK(sn, deptcode, cnum, term, —, g) $\wedge$ (g < min))))}

7. {(deptcode, cnum) | $\exists$ pn1, pn2, dc, t. (CLASS(deptcode, cnum, "FALL 2018", —, pn1) $\wedge$ (PROFESSOR(pn1, —, —, dc) $\wedge \neg$(dc = "CS"))) $\wedge$
((CLASS(deptcode, cnum, t, —, pn2) $\wedge \neg$(t = "FALL 2018")) $\wedge$ PROFESSOR(pn2, —, —, "CS"))}

8. {(pnum, pname) | PROFESSOR(pnum, pname, —, —) $\wedge \exists$ dc1, dc2, cn1, cn2, t, s1, s2.
((CLASS(dc1, cn1, t, s1, pnum) $\wedge$ SCHEDULE(dc1, cs1, t, s1, "Friday", —, —)) $\wedge$
$\neg$(CLASS(dc2, cn2, t, s2, pnum) $\wedge$ SCHEDULE(dc2, cs2, t, s2, "Monday", —, —)))}

9. {(snum, sname) | STUDENT(snum, sname, 4) $\wedge \exists$ t, s, g. ((MARK(snum, "CS", "348", t, s, g) $\wedge \exists$ dc1, dc2, cn1, cn2, s1, s2, g1, g2.
$\neg$(MARK(snum, dc1, cn1, t, s1, g1)) $\wedge$ MARK(snum, dc2, cn2, t, s2, g2)) $\wedge$ ((g1 > g) $\wedge$ (g1 > g))))}

10. {(pnum, pname) | PROFESSOR(pnum, pname, —, —) $\wedge \exists$ dc, cn, t, s1, s2, s1, g, g1, g2, pn2.
((CLASS(dc, cn, t, s1, pnum) $\wedge$ (MARK(sn1, dc, cn, t, s1, g1) $\wedge$ MARK(sn2, dc, cn, t, s1, g2))) $\wedge$
(CLASS(dc, cn, t, s2, pn2) $\wedge$ (MARK(sn, dc, cn, t, s2, g) $\wedge \neg$((g > g1) $\vee$ (g > g2)))))}