Assignment 1 Question 1  
  
Reserve Constraints

for all b∈B,

*x*11​+*x*12​+*x*13​+*x*14​+*x*15​≤1

*x*21​+*x*22​+*x*23​+*x*24​+*x*25​≤1

*x*31​+*x*32​+*x*33​+*x*34​+*x*35​≤1

*x*41​+*x*42​+*x*43​+*x*44​+*x*45​≤1

*x*51​+*x*52​+*x*53​+*x*54​+*x*55​≤1

*x*61​+*x*62​+*x*63​+*x*64​+*x*65​≤1

*x*71​+*x*72​+*x*73​+*x*74​+*x*75​≤1

*x*91​+*x*92​+*x*93​+*x*94​+*x*95​≤1

*x*101​+*x*102​+*x*103​+*x*104​+*x*105​≤1

*x*111​+*x*112​+*x*113​+*x*114​+*x*115​≤1

*x*121​+*x*122​+*x*123​+*x*124​+*x*125​≤1

*x*131​+*x*132​+*x*133​+*x*134​+*x*135​≤1

*x*171​+*x*172​+*x*173​+*x*174​+*x*175​≤1

*x*181​+*x*182​+*x*183​+*x*184​+*x*185​≤1

*x*191​+*x*192​+*x*193​+*x*194​+*x*195​≤1

*x*251​+*x*252​+*x*253​+*x*254​+*x*255​≤1

Mining Capacity Constraint

For year t=1

1000∗x11+1000∗x21+2000∗x31+2000∗x41+1000∗x51+1000∗x61+1000∗x71+2500∗x91+2500∗x101+2500∗x111+2500∗x121+2500∗x131+3000∗x171+3000∗x181+3000∗x191+3500∗x251≤8000

For year t=2

1000∗x12+1000∗x22+2000∗x32+2000∗x42+1000∗x52+1000∗x62+1000∗x72+2500∗x92+2500∗x102+2500∗x112+2500∗x122+2500∗x132+3000∗x172+3000∗x182+3000∗x192+3500∗x252≤8000

For year t=3:

1000∗x13+1000∗x23+2000∗x33+2000∗x43+1000∗x53+1000∗x63+1000∗x73+2500∗x93+2500∗x103+2500∗x113+2500∗x123+2500∗x133+3000∗x173+3000∗x183+3000∗x193+3500∗x253≤8000

For year t=4:

1000∗x14+1000∗x24+2000∗x34+2000∗x44+1000∗x54+1000∗x64+1000∗x74+2500∗x94+2500∗x104+2500∗x114+2500∗x124+2500∗x134+3000∗x174+3000∗x184+3000∗x194+3500∗x254≤8000

For year t=5:

1000∗x15+1000∗x25+2000∗x35+2000∗x45+1000∗x55+1000∗x65+1000∗x75+2500∗x95+2500∗x105+2500∗x115+2500∗x125+2500∗x135+3000∗x175+3000∗x185+3000∗x195+3500∗x255≤8000

Processing Capacity Constraints

For year t=1:

2000∗x31+2000∗x41+1000∗x51+1000∗x61+1000∗x71+2500∗x91+2500∗x101+2500∗x111+2500∗x121+2500∗x131+3000∗x171+3000∗x181+3000∗x191+3500∗x251≤8000

For year t=2:

2000∗x32+2000∗x42+1000∗x52+1000∗x62+1000∗x72+2500∗x92+2500∗x102+2500∗x112+2500∗x122+2500∗x132+3000∗x172+3000∗x182+3000∗x192+3500∗x252≤8000

For year t=3:

2000∗x33+2000∗x43+1000∗x53+1000∗x63+1000∗x73+2500∗x93+2500∗x103+2500∗x113+2500∗x123+2500∗x133+3000∗x173+3000∗x183+3000∗x193+3500∗x253≤8000

For year t=4:

2000∗x34+2000∗x44+1000∗x54+1000∗x64+1000∗x74+2500∗x94+2500∗x104+2500∗x114+2500∗x124+2500∗x134+3000∗x174+3000∗x184+3000∗x194+3500∗x254≤8000

For year t=5:

2000∗x35+2000∗x45+1000∗x55+1000∗x65+1000∗x75+2500∗x95+2500∗x105+2500∗x115+2500∗x125+2500∗x135+3000∗x175+3000∗x185+3000∗x195+3500∗x255≤8000

PRECEDENCE CONSTRAINTS

For block b9=

1. 3∗x91−(x11+x21+x31)≤0
2. 3∗x92−(x11+x12+x21+x22+x31+x32)≤0
3. 3∗x93−(x11+x12+x13+x21+x22+x23+x31+x32+x33)≤0
4. 3∗x94−(x11+x12+x13+x14+x21+x22+x23+x24+x31+x32+x33+x34)≤0
5. 3∗x95−(x11+x12+x13+x14+x15+x21+x22+x23+x24+x25+x31+x32+x33+x34+x35)≤0

**For block** b=10**:**

1. 3∗x101−(x21+x31+x41)≤0
2. 3∗x102−(x21+x22+x31+x32+x41+x42)≤0
3. 3∗x103−(x21+x22+x23+x31+x32+x33+x41+x42+x43)≤0
4. 3∗x104−(x21+x22+x23+x24+x31+x32+x33+x34+x41+x42+x43+x44)≤0
5. 3∗x105−(x21+x22+x23+x24+x25+x31+x32+x33+x34+x35+x41+x42+x43+x44+x45)≤0

**For block** b=11**:**

1. 3∗x111−(x31+x41+x51)≤0
2. 3∗x112−(x31+x32+x41+x42+x51+x52)≤0
3. 3∗x113−(x31+x32+x33+x41+x42+x43+x51+x52+x53)≤0
4. 3∗x114−(x31+x32+x33+x34+x41+x42+x43+x44+x51+x52+x53+x54)≤0
5. 3∗x115−(x31+x32+x33+x34+x35+x41+x42+x43+x44+x45+x51+x52+x53+x54+x55)≤0

**For block** b=12**:**

1. 3∗x121−(x41+x51+x61)≤0
2. 3∗x122−(x41+x42+x51+x52+x61+x62)≤0
3. 3∗x123−(x41+x42+x43+x51+x52+x53+x61+x62+x63)≤0
4. 3∗x124−(x41+x42+x43+x44+x51+x52+x53+x54+x61+x62+x63+x64)≤0
5. 3∗x125−(x41+x42+x43+x44+x45+x51+x52+x53+x54+x55+x61+x62+x63+x64+x65)≤0

For block b=13:

1. 3∗x131−(x51+x61+x71)≤0
2. 3∗x132−(x51+x52+x61+x62+x71+x72)≤0
3. 3∗x133−(x51+x52+x53+x61+x62+x63+x71+x72+x73)≤0
4. 3∗x134−(x51+x52+x53+x54+x61+x62+x63+x64+x71+x72+x73+x74)≤0
5. 3∗x135−(x51+x52+x53+x54+x55+x61+x62+x63+x64+x65+x71+x72+x73+x74+x75)≤0

**For block** b=17**:**

1. 3∗x171−(x91+x101+x111)≤0
2. 3∗x172−(x91+x92+x101+x102+x111+x112)≤0
3. 3∗x173−(x91+x92+x93+x101+x102+x103+x111+x112+x113)≤0
4. 3∗x174−(x91+x92+x93+x94+x101+x102+x103+x104+x111+x112+x113+x114)≤0
5. 3∗x175−(x91+x92+x93+x94+x95+x101+x102+x103+x104+x105+x111+x112+x113+x114+x115)≤0

**For block** b=18**:**

1. 3∗x181−(x101+x111+x121)≤0
2. 3∗x182−(x101+x102+x111+x112+x121+x122)≤0
3. 3∗x183−(x101+x102+x103+x111+x112+x113+x121+x122+x123)≤0
4. 3∗x184−(x101+x102+x103+x104+x111+x112+x113+x114+x121+x122+x123+x124)≤0
5. 3∗x185−(x101+x102+x103+x104+x105+x111+x112+x113+x114+x115+x121+x122+x123+x124+x125)≤0

**For block** b=19**:**

1. 3∗x191−(x111+x121+x131)≤0
2. 3∗x192−(x111+x112+x121+x122+x131+x132)≤0
3. 3∗x193−(x111+x112+x113+x121+x122+x123+x131+x132+x133)≤0
4. 3∗x194−(x111+x112+x113+x114+x121+x122+x123+x124+x131+x132+x133+x134)≤0
5. 3∗x195−(x111+x112+x113+x114+x115+x121+x122+x123+x124+x125+x131+x132+x133+x134+x135)≤0

**For block** b=25**:**

1. 3∗x251−(x171+x181+x191)≤0
2. 3∗x252−(x171+x172+x181+x182+x191+x192)≤0
3. 3∗x253−(x171+x172+x173+x181+x182+x183+x191+x192+x193)≤0
4. 3∗x254−(x171+x172+x173+x174+x181+x182+x183+x184+x191+x192+x193+x194)≤0
5. 3∗x255−(x171+x172+x173+x174+x175+x181+x182+x183+x184+x185+x191+x192+x193+x194+x195)≤0