

### **Chapter 3: Convexity**

The Separation Theorem (3.29; read proof in 4.28)  
Farkas' Lemma for an inequality system (only in the 3rd edition of course book, 3.31)  
Farkas' Lemma (3.37; read proof in 10.10)  
Characterization of convex functions in  $C^1$  (3.61)

### **Chapter 4: Primal optimality conditions**

The Fundamental Theorem of global optimality (4.3)  
Necessary optimality conditions,  $C^1$  case (4.22)  
Necessary and sufficient global optimality conditions (4.23)  
The Separation Theorem (4.28)

### **Chapter 5: Primal–dual optimality conditions**

Karush–Kuhn–Tucker necessary conditions (5.29)  
Sufficiency of the Karush–Kuhn–Tucker conditions for convex problems (5.49)

### **Chapter 6: Lagrangian duality**

Relaxation Theorem (6.1)  
Weak Duality Theorem (6.5)  
Global optimality conditions in the absence of a duality gap (6.8)

### **Chapter 8: Linear programming models**

Existence and properties of optimal solutions (8.10)

### **Chapter 9: The Simplex method**

Finiteness of the Simplex method (9.11)

### **Chapter 10: LP duality and sensitivity analysis**

Weak Duality Theorem (10.4)  
Strong Duality Theorem (10.6)  
Farkas' Lemma (10.10)  
Complementarity Slackness Theorem (10.11)  
Complementarity Slackness Theorem (10.12)  
[(10.11) and (10.12) are proven similarly.]

### **Chapter 13: Constrained optimization**

Global convergence of a penalty method (13.3)