

Problem #1

Determine the forces in the members of the roof truss shown.

Figure:



Reqd:  $F_{AB}$   
 $F_{BC}$   
 $F_{BD}$   
 $F_{AC}$   
 $F_{CD}$

Solution w/ FBD:

Joint C



$$\sum F_V = 0$$

$$0 = -100 + F_{BC}$$

$$\underline{F_{BC} = 100 \text{ kN} \text{ (T)}} \text{ (1)}$$

$$\sum F_H = 0$$

$$0 = F_{BD} - F_{AC} \text{ (2)}$$

Joint A



$$\sum F_H = 0$$

$$0 = F_{AC} - F_{AB} \cos 30$$

$$F_{AC} = 100 \cos 30$$

$$\underline{F_{AC} = 50\sqrt{3} \text{ kN} \text{ (T)}}$$

$$\sum F_V = 0$$

$$0 = R_A - F_{AB} \sin 30$$

$$\underline{R_A = 50 \text{ kN}}$$

Joint B



$$\sum F_V = 0$$

$$0 = F_{BD} \sin 30 + F_{AB} \sin 30 - 100 \sin 30 - 100$$

$$\underline{F_{BD} + F_{AB} = 200 \text{ (LTD)}} \text{ (3)}$$

$$\sum F_H = 0$$

$$0 = F_{AB} \cos 30 - F_{BD} \cos 30 + 100 \cos 30$$

$$\underline{-F_{AB} + F_{BD} = 100} \text{ (4)}$$

$$F_{AB} = F_{BD} - 100$$

Eq. (1)

$$\underline{F_{CD} = F_{AC}}$$

$$\underline{F_{CD} = 50\sqrt{3} \text{ kN} \text{ (T)}}$$

Eq. 2 & (3)

$$F_{BD} + (F_{BD} - 100) = 200 \text{ (LTD)}$$

$$2F_{BD} = 200 \text{ (LTD)} + 100$$

$$2F_{BD} = 300$$

$$\underline{F_{BD} = 150 \text{ kN} \text{ (C)}}$$

$$F_{AB} = 150 - 100$$

$$\underline{F_{AB} = 50 \text{ kN} \text{ (C)}}$$

# Static Mechanics Solution

**Yijin Wang**



## Static Mechanics Solution:

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reference to the basic underlying principles A set of problems is provided for use in homework assignments

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**Damage Mechanics in Metal Forming** Khemais Saanouni,2013-02-04 The aim of this book is to summarize the current most effective methods for modeling simulating and optimizing metal forming processes and to present the main features of new innovative methods currently being developed which will no doubt be the industrial tools of tomorrow It discusses damage or defect prediction in virtual metal forming using advanced multiphysical and multiscale fully coupled constitutive equations Theoretical formulation numerical aspects as well as application to various sheet and bulk metal forming are presented in detail Virtual metal forming is nowadays inescapable when looking to optimize numerically various metal forming processes in order to design advanced mechanical components To do this highly predictive constitutive equations accounting for the full coupling between various physical phenomena at various scales under large deformation including the ductile damage occurrence are required In addition fully 3D adaptive numerical methods related to time and space discretization are required in order to solve accurately the associated initial and boundary value problems This book focuses on these two main and complementary aspects with application to a wide range of metal forming and machining processes

**Instructor's Solutions Manual for Engineering Mechanics, Statics Second Edition** Andrew Pytel,1999

**Mechanics for Engineers** ,1985 *Statics and Mechanics of Materials* William F. Riley,Leroy D. Sturges,Don H. Morris,2001-10-30 The second edition of *Statics and Mechanics of Materials An Integrated Approach* continues to present students with an emphasis on the fundamental principles with numerous applications to demonstrate and develop logical orderly methods of procedure Furthermore the authors have taken measure to ensure clarity of the material for the student Instead of deriving numerous formulas for all types of problems the authors stress the use of free body diagrams and the equations of equilibrium together with the geometry of the deformed body and the observed relations between stress and strain for the analysis of the force system action of a body *An elementary text-book of mechanics. [With] Solutions of problems* Richard Wormell (Science teacher),1892 *Applied Mechanics Reviews* ,1980 **Engineering Mechanics: Dynamics** Francesco Costanzo,Michael Plesha,Gary Gray,2012-01-19 Gray Costanzo Plesha s *Engineering Mechanics 2e* is the Problem Solver s Approach for Tomorrow s Engineers Based upon a great deal of classroom teaching experience Gray Costanzo Plesha provide a visually appealing learning framework to your students The look of the presentation is modern like

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