PROBLEM 1

GIVEN: D = 100 psf L = 70 psf R= 12 psf S= 30 psf
Lr= 20 psf W= 0 psf E= 0 psf

FIND: *Determine the maximum combined loads using the recommended AISC expressions for LRFD.*

METHOD: Use LRFD Equations (AISC p.2-10) to determine the governing factored load for design.

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	1.4D	140							140
2	1.2D+1.6L+0.5(Lr or S or R)	120	112	10	15	6			247
3	1.2D+1.6(Lr or S or R)+(L* or 0.5W)	120	35	32	48	19.2	0		203
4	1.2D+1.0W+L*+0.5(Lr or S or R)	120	35	10	15	6	0	0	170
5	1.2D+1.0E+L* + 0.2S	120	35		6			0	161
6	0.9D+1.0W	90					0		90
7	0.9D+1.0E	90						0	90

***Note:** *Change Load Factor for 1 for public assembly, live loads in excess of 100 psf and for parking garage*

The governing factored load for design is equal to: **247** psf

PROBLEM 3

GIVEN: D = 9000 lb L = 5000 lb R= 0 psf S= 0 lb
Lr= 2500 lb W= 0 psf E= 6500 lb

FIND: *Determine the maximum combined loads using the recommended AISC expressions for LRFD.*

METHOD: Use LRFD Equations (AISC p.2-10) to determine the governing factored load for design.

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	1.4D	12600							12600
2	1.2D+1.6L+0.5(Lr or S or R)	10800	8000	1250	0	0			20050
3	1.2D+1.6(Lr or S or R)+(L* or 0.5W)	10800	2500	4000	0	0	0		17300
4	1.2D+1.0W+L*+0.5(Lr or S or R)	10800	2500	1250	0	0	0	6500	14550
5	1.2D+1.0E+L* + 0.2S	10800	2500		0			0	13300
6	0.9D+1.0W	8100					0		8100

7	0.9D+1.0E	8100	0	8100

***Note:** *Change Load Factor for 1 for public assembly, live loads in excess of 100 psf and for parking garage*

The governing factored load for design is equal to: **20050** lb

PROBLEM 6

GIVEN: Structural Steel beam supports a roof Wr= 20 psf
To determine dead load: B. Self Weight Steel Beam: lb/ft
Tributary Area: 6 ft * 20 lb/ft2
All the values below are calculated considering the tributary area above:

D=	120	plf	L=	0	plf	R=	0	plf	S=	72	plf
			Lr=	108	plf	W=	96	down	E=	0	psf
						W=	-38	up			

Beams are spaced 6ft apart

FIND: *Determine the factored uniformly distributed loads per foot (upward and downward, if appropriate) by which each beam should be designed.*

METHOD: A. Use LRFD Equations (AISC p.2-10) to determine the governing factored load for design.
B. Since no specification was given for the self-weight of the beam, the value is equal to zero.

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	1.4D	168							168
2	1.2D+1.6L+0.5(Lr or S or R)	144	0	54	36	0			198
3	1.2D+1.6(Lr or S or R)+(L* or 0.5W)	144	0	172.8	115.2	0	48		364.8
4	1.2D+1.0W+L*+0.5(Lr or S or R)	144	0	54	36	0	96	0	294
5	1.2D+1.0E+L* + 0.2S	144	0		14.4			0	158.4
6	0.9D+1.0W	108					96		204
7	0.9D+1.0E	108						0	108

***Note:** *Change Load Factor for 1 for public assembly, live loads in excess of 100 psf and for parking garage*

The governing factored load for design is equal to: **364.8** psf

PROBLEM 7

GIVEN:

D =	100	psf	L =	70	psf	R=	12	psf	S=	30	psf
			Lr=	20	psf	W=	0	psf	E=	0	psf

FIND: *Determine the maximum combined loads using the recommended AISC expressions for ASD.*

METHOD: Use ASD Equations (AISC p.2-11) to determine the governing factored load for design.

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	D	100							100
2	D+L	100	70						170
3	D+(Lr or S or R)	100		20	30	12			130
4	D+0.75L + 0.75(Lr or S or R)	100	52.5	15	22.5	9			175
5	D+(0.6W OR 0.7E)	100					0	0	100
6 (a)	D+0.75L+0.75(0.6W)+0.75(Lr/S/R)	100	52.5	15	22.5	9	0		175
6 (b)	D+0.75L+0.75(0.7E)+0.75S	100	52.5		22.5			0	175
7	0.6D+0.6W	60					0		60
8	0.6D+0.7E	60						0	60

The governing factored load for design is equal to: **175** psf

PROBLEM 9

GIVEN: D = 9000 lb L = 5000 lb R= 0 psf S= 0 lb
Lr= 2500 lb W= 0 psf E= 6500 lb

FIND: *Determine the maximum combined loads using the recommended AISC expressions for ASD.*

METHOD: Use ASD Equations (AISC p.2-11) to determine the governing factored load for design.

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	D	9000							9000
2	D+L	9000	5000						14000
3	D+(Lr or S or R)	9000		2500	0	0			11500
4	D+0.75L + 0.75(Lr or S or R)	9000	3750	1875	0	0			14625
5	D+(0.6W OR 0.7E)	9000					0	4550	13550
6 (a)	D+0.75L+0.75(0.6W)+0.75(Lr/S/R)	9000	3750	1875	0	0	0		14625
6 (b)	D+0.75L+0.75(0.7E)+0.75S	9000	3750		0			3413	16163
7	0.6D+0.6W	5400					0		5400
8	0.6D+0.7E	5400						4550	9950

The governing factored load for design is equal to: **16163** lb

PROBLEM 12

GIVEN: Structural Steel beam supports a roof Wr= 20 psf
To determine dead load: B. Self Weight Steel Beam: 0 lb/ft
Tributary Area: 6 ft * 20 lb/ft2
All the values below are calculated considering the tributary area above:

D=	120	psf	L=	0	psf	R=	0	psf	S=	72	psf
			Lr=	108	psf	W=	96	down	E=	0	psf
						W=	-38	up			

Beams are spaced 6ft apart

FIND: *Determine the factored uniformly distributed loads per foot (upward and downward, if appropriate) by which each beam should be designed.*

METHOD: A. Use ASD Equations (AISC p.2-11) to determine the governing factored load for design.
B. Assuming that W16X40 beam is used

SOLUTION:

		Uniform Load Cases							
	Load Combinations	**D**	**L+l**	**Lr**	**S**	**R**	**W**	**E**	**Sum**
1	D	120							120
2	D+L	120	0						120
3	D+(Lr or S or R)	120		108	72	0			228
4	D+0.75L + 0.75(Lr or S or R)	120	0	81	54	0			201
5	D+(0.6W OR 0.7E)	120					57.6	0	177.6
6 (a)	D+0.75L+0.75(0.6W)+0.75(Lr/S/R)	120	0	81	54	0	43.2		244.2
6 (b)	D+0.75L+0.75(0.7E)+0.75S	120	0		54			0	174
7	0.6D+0.6W	72					96		168
8	0.6D+0.7E	72						0	Dura

The governing factored load for design is equal to: **244.2** psf