ENDS 231: Practice Quiz 9

*Note: A one page (one sided) crib sheet is allowed during the quiz, along with a silent, **non-programmable** calculator.*

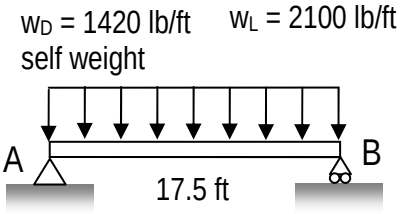
Clearly show your work and answer.

A simply supported steel beam is required to span 17.5 ft and support a roof having 1420 lb/ft of dead load (from materials), the self weight, and 2100 lb/ft of live load. The beam is fully braced. It will be A992 steel (F_y = 50 ksi and F_u= 65 ksi, E = 30 x 10^6 ksi). Use the chart provided.

a) Using Allowable Stress Design methodology, select the most economical section based on bending when F_b = 33.5 ksi.

b) If a W10x15 is used (A = 4.41 in^2, d = 9.99 in, t_w = 0.23 in, b_f = 4.0 in, t_f = 0.27 in), is it adequate for shear when F_v = 21 ksi (ignoring self weight)?

c) *[some short question from the text material]*



S_x In.^{3}	Shape	Depth *d* In.
68.4	**W 18×40**	**17⅞**
66.7	W 10×60	10¼
64.7	**W 16×40**	**16**
64.7	W 12×50	12¼
62.7	W 14×43	13⅝
60.0	W 10×54	10⅛
58.1	W 12×45	12
57.6	**W 18×35**	**17¾**
56.5	W 16×36	15⅞
54.6	W 14×38	14⅛
54.6	W 10×49	10
51.9	W 12×40	12
49.1	W 10×45	10⅛
48.6	**W 14×34**	**14**
47.2	**W 16×31**	**15⅞**
45.6	W 12×35	12½
42.1	W 10×39	9⅞
42.0	**W 14×30**	**13⅞**
38.6	**W 12×30**	**12⅜**
38.4	**W 16×26**	**15¾**
35.3	**W 14×26**	**13⅞**
35.0	W 10×33	9¾
33.4	**W 12×26**	**12¼**
32.4	W 10×30	10½
31.2	W 8×35	8⅛
29.0	**W 14×22**	**13¾**
27.9	W 10×26	10⅜
27.5	W 8×31	8

Answers – <u>Not provided on actual quiz!</u>

a) $S_{x\text{-req'd}}$ = 48.3 in^3 (no self weight), W18x35

b) $f_{v\text{-max}}$ = 13.4 ksi, OK

Disclaimer: Answers have NOT been painstakingly researched.