- 1. (10 pts) Draw a picture to show the correct support conditions that should be used in a structural FE analysis of the following situations:
- (1) One shelf in a bookcase loaded with books.
- (2) A bookend holding books from falling over.
- 2. (20 pts) Identify four problems with the mesh shown.

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Name	Element		Number of nodes
CST	Constant Strain Triangle		3
LST	Linear Strain Triangle		6
Q4	Quadrilateral		4
Q6	bilinear quadratic Quadrilateral		6
Q8	quadratic Quadrilateral		8
Q4	A LST	Q4 Q6 F	B Q8
Many poor connections!			

- 3. (10 pts) The figure on the right shows the displacement results after inputting the problem on the left. Has all the information been entered correctly? If not, what is wrong?
- 4. (10 pts) Give the work equivalent nodal loads for the following distributed load.



- 5. (10 pts) Given: constant strain triangle element shown, plane stress formulation, nodal displacements shown, E = 200 GPa and v = 0.27
- (1) Find the planar strain at center.
- (2) Find the planar stress at center. $[G = \frac{E}{2(1+\nu)}]$



- 6. (30 pts) Given: linear quadrilateral element shown, plane strain formulation, a = b = 10 mm, nodal displacements shown, E = 200 GPa and v = 0.27
- (1) Find shape functions when $N_1 = \frac{(a-x)(b-y)}{4ab}$.
- (2) Find the displacement at the center.
- (3) Find the planar strain at center.
- (4) Find the planar stress at center.

