Name:

Exam 2

1. (40 pts) Use the J-Integral to find G_I and G_{II} for the DCB specimen shown. The displacement of an end-loaded cantilever beam is given by

$$v = \frac{Px^2}{6EI}(3L - x) \tag{1}$$

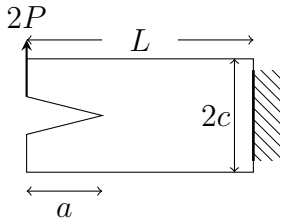

Figure 1: DCB for Problem 1

2. (20 pts) Draw a diagram and explain how to perform the virtual crack closure method in finite elements.

3. (20 pts) When cracks are under mixed-mode loading conditions, it has been shown that the crack will propagate at some angle, θ_0 away from the initial crack orientation. Explain one method of predicting this direction.

4. (20 pts) Sketch K_R-curves for a material with two different initial crack lengths (two different panels of the same material tested). Show on your sketch four potentially different values for K_C of this material and describe how they are found.