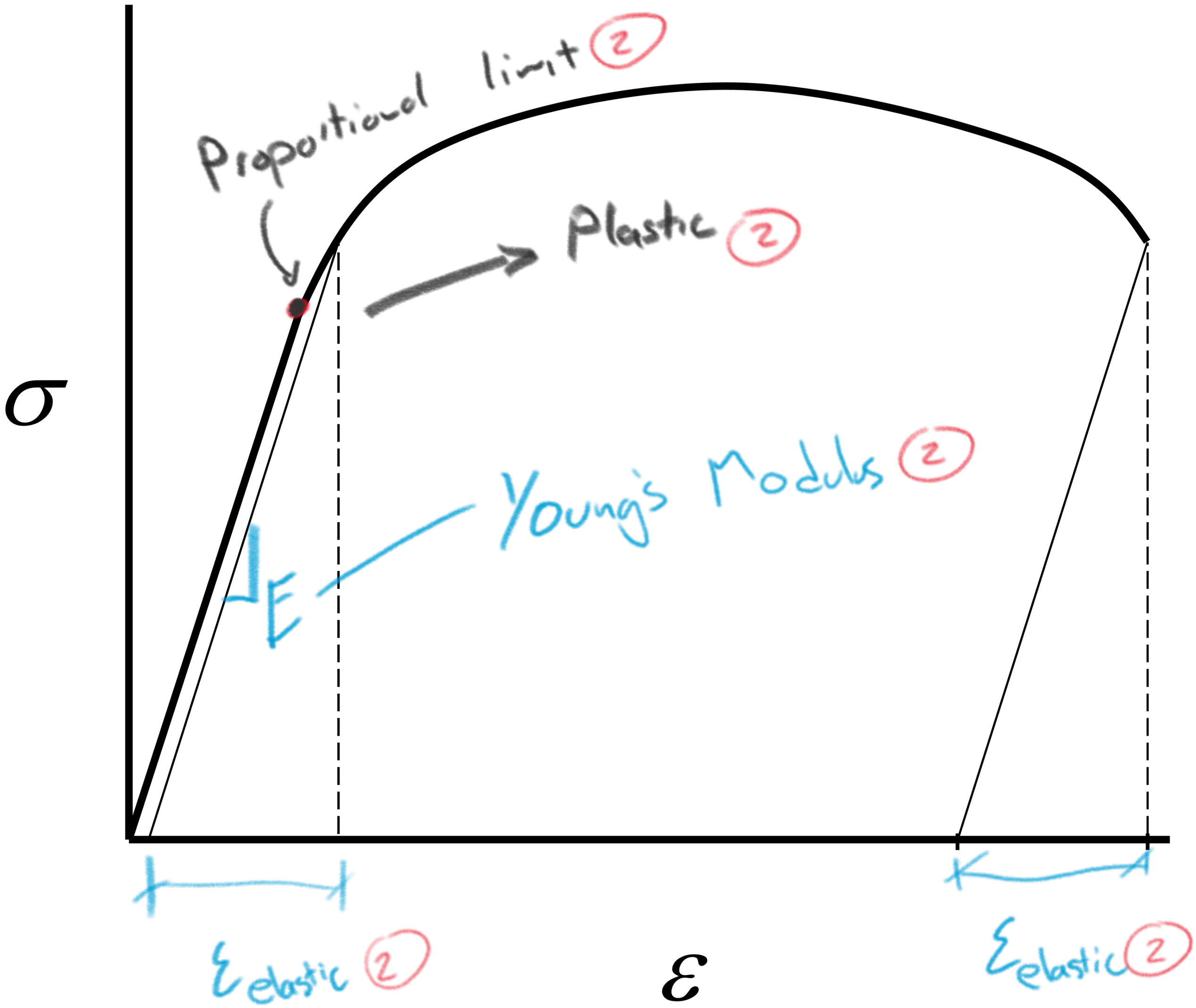
C	
D	
C	
C	
A	
C	
D	
D	
A	
C	
D	
C	
D	
A	
D	

Student No____________________________________

2. (10) A friend of yours who tried to binge-watch the APS164 videos is now cramming for the test. He found the following stress-strain curve on the ground in a room that some APS164 students had been studying in and is concerned that he doesn't know what any of it means. On the figure below, very clearly identify and label all the important features that we have discussed so far in this course.



Student No___________________________________

3. (5) A 60 kg mass is supported by a 5 mm diameter hypothetical metal rod. At this load the strain is determined to be 0.7. Assuming the rod does not undergo plastic deformation determine the Young's modulus of this alloy.

$E = \frac{\sigma}{\varepsilon}$ | $\sigma = \frac{F}{A}$ $\boxed{\varepsilon = 0.7}$ | $F = ma$ $A = \pi R^2$ | $m = 60\ kg$ $a = 9.81\ \frac{N}{kg}$ (1) $R = \frac{5(10^{-3})}{2}\ m$ (1)

(1) $E = \frac{F}{A \cdot \varepsilon} = \frac{ma}{\pi R^2 \cdot \varepsilon} = \frac{60 \cdot 9.81}{\pi\left(\frac{5(10^{-3})}{2}\right)^2 \cdot 0.7} = 4.3(10^7)$

$= 43\ MPa$

(1) (1)

4. (5) A metallic tensile specimen with diameter 12 mm, reduced section length 95 mm, and gauge length 145 mm is loaded in tension. It is loaded slowly to 550 N and the gauge length is measured to be 145.3 mm. It is then slowly unloaded to 0 N and the gauge length is measured to be 145 mm. The sample is then loaded again to 625 N, at which point it fractures. Assuming this metal behaves in a generally typical manner for a metal, on the axes below, sketch the engineering stress – engineering strain curve for this metal. Indicate the final plastic strain in the sample, after fracture. Indicate any information that you needed to estimate.