1. (2+3+5=10 points) Let a lamina be the region bounded between $y = x^3$ and $y = \sqrt{x}$ (see picture above). The density of the lamina is $\rho Kg/m^2$.

   a) (2 points) Set up but do not evaluate an integral for the total mass.

   b) (3 points) Set up but do not evaluate an integral for the moment $M_y$ around the $y$ axis.

   c) (5 points) Compute the moment $M_x$ around the $x$-axis (your answer should involve $\rho$).

2. (3+2=5 points) Consider the integral $\int_0^2 x^2$.

   (3 points) Approximate the above integral using Simpsons rule with $n = 4$ steps.

   (2 points) If $R_{100}, M_{100}, L_{100}$ are the right, middle, and left point approximations of the above integral with $n = 100$ steps select the correct answer:

   a) $R_{100} < M_{100} < L_{100}$.

   b) $L_{100} < M_{100} < R_{100}$.

   c) $R_{100} < L_{100}$, and we cannot know how $M_{100}$ relates to them without computing.

   d) $L_{100} < R_{100}$, and we cannot know how $M_{100}$ relates to them without computing.