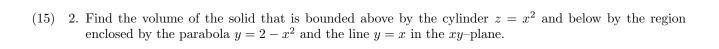
INSTRUCTIONS: Write legibly. Indicate your answer clearly. Show all work; explain your answers. Answers with work not shown might be worth **zero** points. No calculators, cell phones, or cheating.

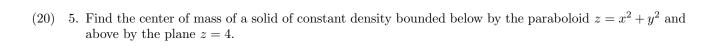
Problem	Worth	Score
1	10	
2	15	
3	15	
4	20	
5	20	
6	20	
Total	100	

(10) 1. Evaluate the following integral over $0 \le x \le \ln 2$ and $0 \le y \le \ln 2$:

$$\int \int e^{x-y} \, dA =$$



(15)	3. Find the average value of the function $f(x,y) = \sin(x-y)$ over the rectangle $0 \le x \le \pi$ and $0 \le y \le \pi/2$.
(20)	eeject $ \begin{tabular}{l} 4. The region that lies inside the cardoid $r=1+\cos\theta$ and outside the circle $r=1$ is the base of a solid right cylinder. The top of the cyclinder lies in the plane $z=x$. $
	(b) Calculate the volume of the cyclinder. (Skip the calculation if you don't have enough time.)



(20) 6. Find the average value of the function $f(\rho, \phi, \theta) = \rho$ over the solid ball $\rho \leq$	1.
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Think of $f(\rho, \phi, \theta) = \rho$ as density function. Express the moment of inertia about any central axis as an iterated integral.