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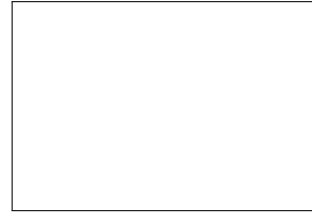
Read all of the following information before starting the exam:

- **WRITE YOUR NAME AT THE TOP OF EACH PAGE** (you will lose points otherwise)
- **DO NOT WRITE ON THE FRONT OR BACK OF THE FIRST PAGE** other than writing your name.
- Show all work and give explanations where needed. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Use only the paper provided, your one page notes and a pen or pencil.
- Write your answer in the box provided.
- This test has 6 problems 1 of which is a bonus problem and is worth 50 points, It is your responsibility to make sure that you have all of the pages!
- Good luck!

1	
2	
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Bonus	
total	

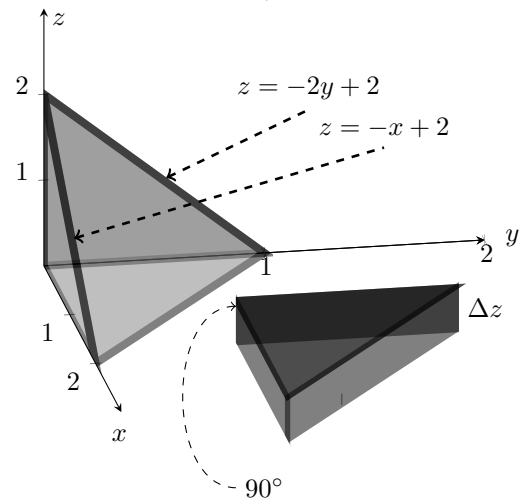
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1. (10 points) Use Riemann sums with $n = 4$ and left (Hint: or top) endpoints to compute the area **BETWEEN** the curves $x = 2y^2$ and $x = y^2 + 1$.



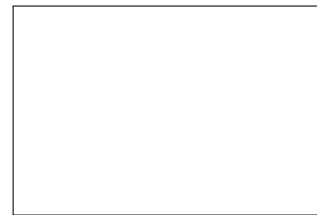
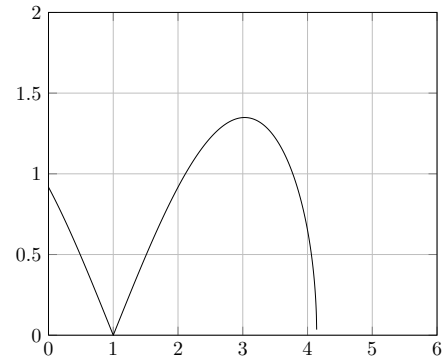
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2. (10 points) Compute the amount of work required to pump water out of the shape below. Use the constant ρ for density and g for gravity. Note that the estimating shape is a “right triangle” box. Also notice the legs of the estimating shape are not equal. Would it take more less or the same amount of work to pump the water out of the shape if it were upside down?



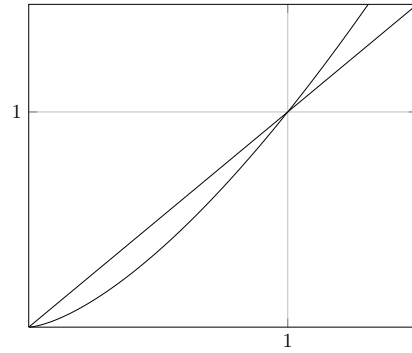
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3. (10 points) Let R be the region bounded by $f(x) = \sqrt{(x-1)\sin(x-1)}$, $x = 1$, $x = \pi + 1$ and the x -axis. Find the volume of the solid generated by rotating R about the x -axis.



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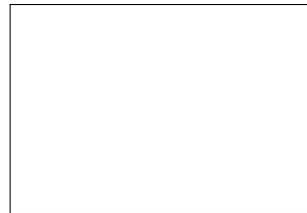
4. (10 points) Find the length of the perimeter of the shape enclosed by $f(x) = x^{3/2}$ and $g(x) = x$.



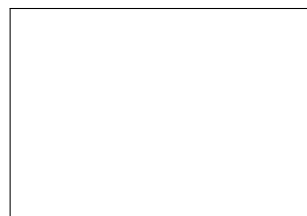
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5. (10 points) Compute the following integrals:

(a) $\int \ln(x) dx$



(b) $\int (\ln(x))^2 dx$



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6. (5 points) This is a *bonus* problem. It involves the shell method which we did not go over in class. If you do not know the shell method, then only try this problem if you have extra time.

Find the volume obtained by rotating the shape bounded by $f(x) = \sin(x)$ and $y = 0$ about $x = -1$.

