NAME_____ 9:20, 10:20, 12:20
Circle your class time.

- No calculator is allowed. Do not round off answers. If you get 10/6 as an answer, you should leave your answer as 5/3. No decimal approximations, please.

- If you have any questions, please raise your hand and ask. The worst that will happen is that I will say, "I can't tell you."

- Do the problems that you find easiest first. Take deep breaths between questions.

- There are 100 points on this exam, and you have 110 minutes.

- I hope you all do well. Good luck!

| Question	Points	Points Earned
1a	10	
1b	8	
2	9	
3	9	
4	9	
5	7	
6	7	
7	7	
8	7	
9	7	
10	5	
11	5	
12	5	
13	5	
TOTAL	100	

Take three deep breaths.

What information have you been given?

What information do you need?

How can you get from one to the other?

1. (30 pts.) Set up but DO NOT EVALUATE an integral that equals the volume of the solid described below.

   (a) The volume is generated by revolving the region bounded by $x = y^2 - 16$ and $y = x + 4$ about the line $x = 1$.
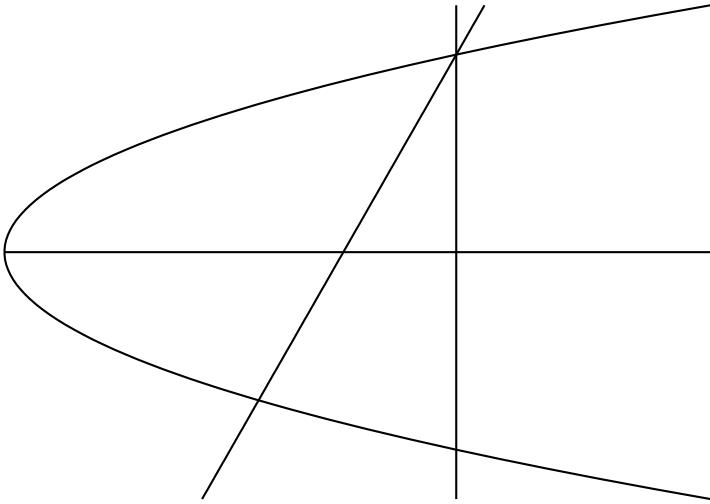
   (b) The volume is generated by revolving the region bounded by $x = y^2 - 16$ and $y = x + 4$ about the line $y = 5$. (The region is the same as in Part a.)
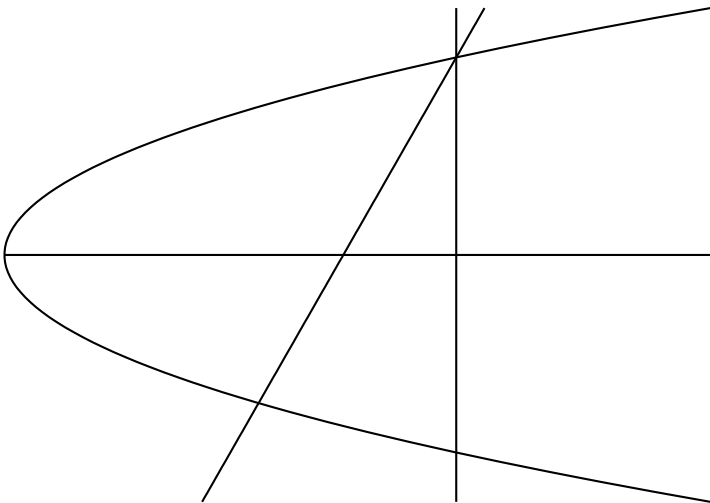
2. (15 pts.) Set up but DO NOT EVALUATE an integral equal to the volume of the region bounded by $y = \cos(x)$, $x = 0$, and $y = x - \frac{\pi}{2}$ rotated about the y–axis.

3. (15 pts.) Set up but DO NOT EVALUATE an integral that equals the volume of the region described here: The boundary curve of the base is given by $x^2 + y^2 = 9$. Cross sections perpendicular to the x–axis are equilateral triangles.

4. (15 pts.) A hemispherical bowl with radius r is filled with water to a depth h ($h < r$). Set up but DO NOT EVALUATE an integral that equals the volume of water in the bowl?

Evaluate the following integrals completely. Use appropriate notation as discussed in class.

5. Reduce your answer completely:
$$\int_{\sqrt{2}}^{1} \frac{1}{t\sqrt{t^2 - 1}}\, dt$$

6. $\int \dfrac{1}{t\left((\ell n t)^2 + 1\right)}\, dt$

7. $\displaystyle\int x^2 \sec(x^3 + 2)\tan(x^3 + 2)\,dx$

8. Stop simplifying when your answer is entirely made up of numbers.

$$\int_{-2}^{0} \frac{3t^5}{\sqrt{1 - t^3}}\,dt$$

9. $\displaystyle\int \frac{e^x}{\sqrt{1 - e^{2x}}}\,dx$

10. (5 pts.) Evaluate $\tan^{-1}(1)$:

11. (5 pts.) Evaluate $\sin^{-1}\left(\sin\left(\frac{4\pi}{3}\right)\right)$:

12. (5 pts.) Find and simplify $\frac{dy}{dx}$ for $y = \arctan(e^x) - \cos\left(\sin^{-1}(x)\right)$.

13. (5 pts.) Simplify the following to an expression without trig or inverse trig functions.

$\tan\left(\cos^{-1}\left(\frac{x}{5}\right)\right)$