Math 1B Worksheet 5:
Smorgasbord of Integeration

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Please introduce yourselves to each other, and put your names at the top of a piece of blackboard. Take turns being the scribe: each of you should have a chance to write on the chalkboard for at least one of the exercises.

These exercises are hard — harder than on the homework, quizzes, or exams. That means that you should spend some time thinking and talking about them; they're designed to be solved in groups (the best way to learn mathematics). The problems are roughly in order of increasing difficulty. I don't expect any group to solve all of them.

1. Integrate
$$\int \frac{dx}{x^2\sqrt{9-x}}$$
2. Integrate
$$\int \frac{1+\sqrt[3]{t^2}}{\sqrt{t}+\sqrt[3]{t}}\,dt$$
3. Integrate
$$\int x^2\,e^x \sin x\,dx$$
4. Recall that the hyperbolic cosine cosh is defined as $\cosh x = \frac{1}{2}\left(e^x + e^{-x}\right)$. Guess a definition for $\operatorname{sech} x$ and integrate
$$\int \operatorname{sech} x\,dx$$
5. Find the volume of the solid of revolution formed by taking the graph of $y = \arcsin x$ (what's the domain of this function? what's its graph?) and revolving it around the x-axis.