MATH 107-153 Recitation 8-9

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p. 351 #15, 16: Consider the two integrals

$$\int x^2 e^{3x}\ dx \quad \textbf{and} \quad \int x^2 e^{x^3}\ dx \ .$$

Both of these integrals can be solved using tools you already have, but one is much nicer than the other.

1. **Identify and solve the easier integral.**

2. **Come up with a "plan of attack" for the harder integral. In other words, decide which integration technique you would use to solve it and, if relevant, what subsitutions you would make (such as choosing a u for u-substitution or a u and a dv for integration by parts.**

3. **Instead of solving the integral that way, find an applicable rule in a table and use that to find the integral. Can you see how your technique would have lead to the correct answer?**

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p. 351 #34: Solve the integral

$$\int \frac{1}{y^2 + 4y + 5} \, dy$$

using the following steps:

1. **Look at a table of integrals and decide on the form**

$$\int \frac{1}{x^2 + a^2} \, dx = \frac{1}{a} \arctan \frac{x}{a} + C, a \neq 0.$$

2. **Use the "completing the square" technique to get the integral into the appropriate form.**

3. **Apply the ingegration rule you chose in step 1.**

3: Let a and b be distinct real numbers. Use partial fraction decomposition to find a simpler form of $\frac{1}{(x-a)(x-b)}$. Then use this decomposition to find

$$\int \frac{1}{(x-a)(x-b)} \, dx.$$

Finally, compare your answer to formula V. 26 in the back of the book.