1) [30 points] Prove the integration by parts formula. This should include a couple of explanatory sentences.

2) [30 points] Use $2n = 6$ subintervals to approximate $\int_1^4 e^{+x} \, dx$ [this is a correction from the original problem; $\int_1^4 e^{-x} \, dx$] using Simpson’s rule. Simplify as far as you can without dividing (but you may also divide, if you want to check your answer). You can leave the answer as a fraction, such as $3.72/18$. You may use these approximations:

\[
\begin{align*}
e^1 &= 2.7 \\
e^{1.5} &= 4.5 \\
e^2 &= 7.3 \\
e^{2.5} &= 12.0 \\
e^3 &= 19.8 \\
e^{3.5} &= 32.5 \\
e^4 &= 53.9
\end{align*}
\]

3) [40 points] Evaluate this improper integral (or explain why it diverges). Show every step, since I will mainly grade your method. Hint 1: it may be improper for multiple reasons. Hint 2: You may need an unusual substitution, such as $x = u^2$ or $u = \cot(x)$.

\[
\int_0^\infty \frac{dx}{\sqrt{x(x+1)}}
\]

Remarks and Answers: The average grade was about 57/100. The scale for this Quiz is: A’s = 70-100, B’s 60-69, etc.

The current scale for your semester average is: A’s 82-100, B’s 72-81, C’s 62-71, etc. I wrote your grade into the upper right corner of your quiz. This still does not include HW (or the final, of course).

1) See your lecture notes, or the text. Mention the Product Rule.

2) If you corrected the typo (from $e^{-x}$ to $e^{+x}$) the answer was 306.8/6. Otherwise, I said you could leave your answer unsimplified.

3) $\pi$. This is Example 6(c), page 574. Mainly, I wanted to see the integral split in two, with $\lim_{x \to 0}$ and $\lim_{M \to +\infty}$ used separately. If you wrote something like $2\tan^{-1}(u)|_0^\infty = \pi$, you got approx 30 points for the right number, but this method is a bit sloppy.