§7.1 Integration by Parts. $u = x \ldots$

Something basic, like $\int x e^x dx$

Something a little advanced.... ? Will check homework for something cool

$$\int \sin^4 x \, dx$$

§7.2 Trig Integrals.

$\int \sin^m x \cos^n x \, dx$ Keep it basic.

§7.3 Trig Substitution

Something simple, with $\sqrt{x^2+a^2}$, $\sqrt{a^2-x^2}$ or $\sqrt{x^2-a^2}$ in it.

(You'll be able to check against a formula, but I'll want to see the moves for trig subst.)

§7.4 Partial Fractions.

$$\int \frac{dx}{x^2+bx+c} = \int \frac{A}{x-r_1} + \int \frac{B}{x-r_2}$$

May ask you to set up something like

$$\int \frac{3x^2-5x+6}{(x^2+7x+97)(x+2)(x-7)^3}$$. Show me this:

$$\frac{3x^2-5x+6}{(x^2+7x+97)(x+2)(x-7)^3} = \frac{Ax+B}{x^2+7x+97} + \frac{C}{x+2} + \frac{D}{x-7} + \frac{E}{(x-7)^2} + \frac{F}{(x-7)^3}$$

to show you know how to set it up.

(I'm assuming $x^2+7x+97$ is irreducible over $\mathbb{R}$. check:

$b^2-4ac = 7^2-4(1)(97) < 0$ Yes.

No $\mathbb{R}$ roots.

§7.5 Integration Techniques.
Don't necessarily see a separate problem just for this. Opportunities abound. If you can't do 7.5, you'll run into problems with other stuff.

§7.6 Integration with Tables & Computers.
One or two that require a look-up.

§7.7 Approximate Integrals
Probably a MAT 201-type question asking you to maximize $|f(x)|$. Relates to error bounds calculations.

§7.8 Improper Integrals.

could be where lots gets asked

Type 1 : $\int_a^{\infty}$, etc.

Type 2: $\int_a^b \frac{dx}{x-a}$ or $\int_0^{10} \frac{dx}{(x-5)^{1/2}}$

This is a section where 7.5-type questions could arise.