Questions to consider
Sect's 7.7, 8.1, 8.2, 8.4, 8.5
MA 2160, T. Olson

1. What is an "improper" integral?
2. What does it mean for an improper integral to converge?
3. What are the two basic kinds of improper integrals, and how do you evaluate each?
4. If $f(x)$ is continuous and increasing, does $\int_3^\infty f(x)\,dx$ necessarily converge? Does it necessarily diverge? (Can you give examples?)
5. If $f(x)$ is continuous and decreasing to zero, does $\int_3^\infty f(x)\,dx$ necessarily converge? Does it necessarily diverge? (Can you give examples?)
6. Suppose you are given a table listing the cross-sectional area of a solid at several y values. How could you estimate the volume of the solid?
7. How are mass and density related? How can you tell from their units?
8. How are work and force related?
9. How are pressure and force related?
10. How is water pressure related to the depth of the water?
11. How are mass and weight related? Which one is a force?
12. How do you find the y coordinate of the center of mass of an object with constant density? ...of an object with varying density?
13. For computing work against gravity, why do we always seem to slice horizontally? Why do we slice at all? Why not make vertical slices?
14. You teacher keeps telling you not to ignore the "dx" (or whichever "$d$stuff" you have). Why? (I can think of at least three reasons).
15. Suppose you have a region in the x-y plane and you generate a solid by spinning it about the y-axis. How do you sketch the 3-D solid? How would you slice it to find the volume of the solid (at a fixed x value or a fixed y value)? Would "dx" or "dy" be the thickness of the slice?
16. Consider the solid in the previous question (with a constant mass density):
    If you wanted to find the center of mass of the 3-D solid, which coordinate would require an integral? How would the center-of-mass integral be different from the total-volume integral?
17. How do you find the arc length of the graph of $y = f(x)$ between two points?
18. How do you find the center of mass for a system of "point masses"?
19. How do you find the center of mass for a continuous solid with constant density?
20. How do you find the center of mass for a continuous solid with a density that depends only on the x-coordinate?

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21. Physics formula/definitions you should know: how to get mass from density, center of mass, relationship between weight (force) and mass, work, how to get total force from pressure, water pressure (in terms of density and depth)
22. Geometric formulas you should know: area and circumference of a circle, area of a square, area of a triangle, area of an annulus, Pythagorean theorem, trig. functions in terms of a triangle

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Besides thinking about the questions above, here are some other ways to study for the test:

- For each section in the text, try to summarize the BIG IDEA and list the skills you need.
- Review the worksheets and in-class examples covering this material.
- Read through the examples in the book, and after going through each try to summarize the procedure or idea in a few sentences.
- Review any quizzes on this material.
- Review your homework on this material. Concentrate on "How did I decide where to start? Why did my approach work?"
- Memorize formulas that you will need.
- Read through the review problems in the book and decide how you would approach each one.
- Read through your old lab notebooks, concentrating on the ideas rather than the computations. Ask yourself: "What did we do here? Why?"

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