

Here are some practice problems that are about the right level for the test. I'll discuss any that are causing difficulties on Wednesday. Test will only go from 8.3 to 9.4.

Q1. Find the integrals of the following functions:

$$x^2\sqrt{1-x^2}, \quad \frac{1}{\sqrt{1+x^2}},$$
$$\frac{1}{(x-1)(x-2)}, \quad \frac{x}{(x+1)(x^2+1)}$$

Q2. Decide convergence or divergence of these integrals:

$$\int_0^1 \frac{e^x}{\sqrt{x}} dx \quad \int_0^\infty xe^{-x} dx \quad \int_0^1 \ln x dx \quad \int_0^\infty \frac{1}{x(1+\sqrt{x})} dx$$

Q3. Solve

$$x^2y' = e^y, \quad x^2y' + 2xy = \ln x, \quad y' + y = x^2$$

Q4. A tank contains 100 gal of pure water. Brine containing 2 pounds of salt per gal is pumped in at 4 gal per minute and the mixture is pumped out at the same rate. Set up and solve a differential equation for the amount of salt in the tank at time t .

Q5. Set up the integrals that give the lengths of the curves

$$y = x^3, \quad 0 \leq x \leq 1$$

$$x = \sin y, \quad 0 \leq y \leq 1$$

$$x = \cos t, \quad y = 2 \sin t, \quad 0 \leq t \leq 2\pi$$

Q6. Set up the integrals that give the surface area when the curves

$$y = x^3, \quad 0 \leq x \leq 1$$

$$x = \sin y, \quad 0 \leq y \leq 1$$

$$x = \cos t, \quad y = 2 \sin t, \quad 0 \leq t \leq 2\pi$$

are rotated about both x and y axes.