Math 21B
Kouba
Discussion Sheet 7

1.) The population of Tumbleweed, Texas, was 153 in 1850 and 587 in 1998. Assuming exponential growth,

a.) what will the population be in 2050 ?

b.) what was the population in 1800 ?

2.) Hay contains 10 times the allowable amount of iodine 31. The half-life of iodine 31 is 8 days. In how many days will the amount of iodine 31 reach a safe, allowable level ?

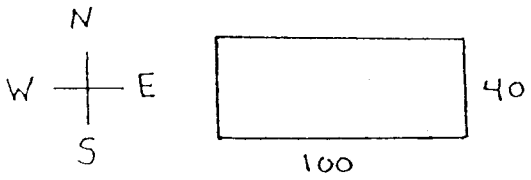
3.) A thin rod of length 3 ft. has variable density. Its density x ft. from its left end is $\sqrt{x+4}$ kg./ft. SET UP, BUT DO NOT EVALUATE an integral which represents the total mass of the rod.

4.) A flat square plate of side length 3 ft. has variable density. Its density x ft. from its left edge is $\sqrt{x+4}$ kg./ft.^{2} SET UP, BUT DO NOT EVALUATE an integral which represents the total mass of the plate.

5.) A solid three-dimensional object of length 3 ft. has variable density. Its density x ft. from its left end is $\sqrt{x+4}$ kg./ft.^{3} Its cross-sectional area x ft. from its left end is (x^2+x+5) ft.^{2} SET UP, BUT DO NOT EVALUATE an integral which represents the total mass of the object.

6.) A flat circular plate of radius 3 ft. has variable density. Its density x ft. from its center is $\sqrt{x+4}$ kg./ft.^{2} SET UP, BUT DO NOT EVALUATE an integral which represents the total mass of the plate.

7.) Snow has fallen in a rectangular region 40 miles by 100 miles. The depth of snow x miles north of the southern edge of the region is $(3+\frac{x}{2})$ inches. Find the total accumulation (volume in cubic inches) of snow in the region.



8.) Use any method to integrate the following.

a.) $\int \frac{x^3}{1+x^4}\,dx$ b.) $\int \frac{x}{1+x^4}\,dx$ c.) $\int \frac{1}{\sqrt{4x-x^2}}\,dx$ d.) $\int \frac{x+1}{x+e^{-x}}\,dx$

THE FOLLOWING PROBLEM IS FOR RECREATIONAL PURPOSES ONLY.

9.) A camp cook wants to measure four ounces of vinegar out of a jug, but he has only an unmarked five-ounce container and an unmarked three-ounce container. How can he do it ?