Name:_

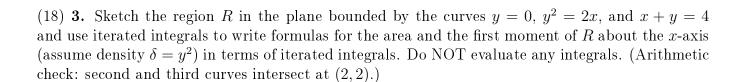
Score:__

Instructions: Show your work in the spaces provided below for full credit. Use the reverse side for additional space, but clearly so indicate. You must clearly identify answers and show supporting work to receive any credit. Exact answers (e.g., π) are preferred to inexact (e.g., 3.14). Make all obvious simplifications, e.g., 0 rather than $\sin \pi$. Point values of problems are given in parentheses. Point values of problems are given in parentheses. Notes or text in any form not allowed. The only electronic equipment allowed is a calculator.

(14) **1.** Evaluate the integral $I = \int_0^1 \int_0^{3-3x} \int_0^{3-3x-y} dz \, dy \, dx$.

(18) **2.** Sketch the region D over which the iterated integral I below is calculated. Then express the integral in the order dy dz dx and write a formula for the average value of f(x, y, z) over D in terms of iterated integrals. Do NOT evaluate any integrals.

$$I = \int_0^4 \int_0^1 \int_{2u}^2 f(x, y, z) \, dx \, dy \, dz.$$



(20) **4.** A solid D is bounded by the surfaces z=1 and $z=\sqrt{x^2+y^2}$. Sketch it and express the integral $I=\iiint_D f\left(x,y,z\right)\,dV$ as an iterated integral in both cylindrical and spherical coordinates. Use one of these to express the moment of inertia I_z about the z-axis of a solid occupying D with density function $\delta=z$ as an iterated integral. Do NOT evaluate it.

