Review for Exam II

Calculus II sec. 001 Summer 2015

Sections Covered:6.2, 6.3, 6.4, 6.5, 6.6, 7.1, 7.2

This practice exam is intended to give you a rough idea of the types of problems you can expect to encounter. **Nothing else is intended or implied.**

(1) The region in the first quadrant bounded by the curves $y = x^2$, $y = 2 - x^2$ and the y-axis is

(a) rotated about the x-axis. Find the volume of the resulting solid.

(b) rotated about the y-axis. Find the volume of the resulting solid.

(2) A solid has as its base the same first quadrant region from problem (1). Cross sections taken perpendicular to the x-axis are

(a) squares with one side in the xy-plane. Find the volume of the solid.

(b) semi-circles with diameter in the xy-plane. Find the volume of the solid.

(3) The region bounded by the x-axis, the y-axis and the curve $y = \cos x$ for $0 \leq x \leq \frac{\pi}{2}$ is rotated about the y-axis to generate a solid. Use the method of shells to find its volume.

(4) A 3 lb force is required to compress a spring 6 inches from its equilibrium length. Find the work done compressing this spring from equilibrium length to 1 foot beyond equilibrium.

(5) A 60 lb chain is 20 feet long and has a uniform density. The chain hangs over a bridge and is pulled up by a winch. Find the work done lifting the chain.

(6) Find an integral representation for the length of the curve $y = e^{\frac{x}{2}}$ from $x = 1$ to $x = 4$. Do not evaluate the integral.

(7) Find the length of the curve $y = \frac{1}{3}(x^2 + 2)^{3/2}$ from $x = 2$ to $x = 4$. (Actually compute this one.)

(8) Evaluate each integral using any applicable method.

(a) $\int x \sec^2 x \, dx$

(b) $\int 2xe^{x^2} \, dx$

(c) $\int 2xe^{x} \, dx$

(d) $\int \sin^2 \theta \, d\theta$

(e) $\int \tan^{-1} t \, dt$

(f) $\int \sec^4 x \tan x \, dx$

(g) $\int \cos^3 t \sin^2 t \, dt$

(h) $\int \sqrt{\cot x} \csc^2 x \, dx$

(9) Evaluate the integral by first using a substitution and then integration by parts.

$$\int e^{\sqrt{x}} \, dx$$