Math 152

Winter 2004

Review 2

(1.) Find the volume of the solid whose base is the region bounded by the curves $y = x$ and $y = x^2$ and which has equilateral triangles as cross sections which are perpendicular to the x-axis.

(2.) Setup both an integral using the disk/washer method and one using the shell method to find the volume of the given solid. Then use either method to find the volume of the solid.

(a.) The solid formed by rotating the region bounded by $y = e^x$, $y = 1$ and $x = \ln 3$ about the x-axis

(b.) The solid formed by rotating the region bounded by $y = x^2$ and $x = y^2$ about the line $x = 2$

(3.) Find the length of the curve which is parameterized by $x = \frac{2}{9}t^{9/2}$, $y = \frac{1}{3}t^3$ with $0 \leq t \leq 2$.

(4.) Let C be the curve parameterized by $x = \frac{e^{2t}}{2}$, $y = e^t$ with $0 \leq t \leq \ln 2$. Find the area of the surface which is formed by rotating C about the x-axis.

(5.) Yttrium-90 is a radioactive isotope used in nuclear medicine. It has a half-life of 64 hours. It is also known that at least 5 ng of it must be present in a body to be effective. Suppose that a person is given a dose of 12 ng.

(a.) How much will be present after 30 hours?

(b.) How long will this dose remain to be effective?

(6.) Find the derivative of the given function:

(a.) $f(x) = (5x)^{2x-1} + 5^{x+3}$

(b.) $g(t) = \frac{\sec^{-1}(t^2)}{\ln t}$

(c.) $f(x) = \tan^{-1}(\sin 3x)$

(d.) $h(t) = e^t \log_2(t^3)$

(7.) Find the integral:

(a.) $\displaystyle\int \tan 3x + \cot 3x \, dx$

(b.) $\displaystyle\int \frac{1}{x\sqrt{1 - (\ln x)^2}} \, dx$

(c.) $\displaystyle\int \frac{3x}{1 + x^4} \, dx$

(d.) $\displaystyle\int_e^{e^2} \frac{1}{t \ln t} \, dt$