MATH 166
SUMMER 2011
QUIZ 3

1. Consider the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1;\ a, b > 0.$$

i) (5 pt) Find the volume obtained when the upper half of this ellipse is revolved about the $x-$axis.

ii) (5 pt) Find the volume obtained when the right half of this ellipse is revolved about the $y-$axis.

iii) (5 pt) What happens to your answers from i) and ii) when $a = b$? Does this make sense? Why?

2. (5 pt) Find the volume obtained when the region bounded by $f(x) = x$ and $g(x) = x^n, n > 1$ is revolved about the line $x = -1$.

3. Suppose that we have a solid object whose volume at height x is given by

$$V(x) = \int_0^x A(t)dt.$$

i) (5 pt) If the volume of this object is given by $V(x) = \frac{4}{3}\pi x^3$, determine the cross sectional area at height x.

ii) (5 pt) Given that we know that the volume of a sphere of radius R is $\frac{4}{3}\pi R^3$, explain how the previous part can be used to deduce that the surface area of a sphere is given by $S = 4\pi R^2$.