MATH 138 Calculus 2, Assignment 4 Due Mon Nov 4, 11:00 pm

1: Let R be the region $0 \le x \le 3$, $0 \le y \le 3 + 2x - x^2$, and let S be the solid obtained by revolving R about the y-axis.

(a) Find the volume of S by integrating with respect to x.

(b) Find the volume of S by integrating with respect to y.

2: Let R be the region $1 \le x \le 2$, $0 \le y \le \dfrac{1}{x\sqrt{x^2+2x}}$.

(a) Find the volume of the solid obtained by revolving R about the x-axis.

(b) Find the volume of the solid obtained by revolving R about the y-axis.

3: Let R be the (infinitely long) region $0 \le x < \infty$, $0 \le y \le \dfrac{2\sqrt{x}}{4+x^2}$.

(a) Find the volume of the solid obtained by revolving R about the x-axis.

(b) Find the area of R.

4: Let S be the solid $0 \le x \le 2$, $-x \le y \le x$, $0 \le z \le x^2 - y^2$.

(a) Find the volume of S by integrating with respect to x (hint: the base of the solid is the triangle in the xy-plane with vertices at $(0,0)$, $(2,-2)$ and $(2,2)$, and the cross-section at x is shaped like the region in the yz-plane given by $-x \le y \le x$, $0 \le z \le x^2 - y^2$).

(b) Find the volume of S by integrating with respect to y (hint: the base of the solid is the triangle in the xy-plane with vertices at $(0,0)$, $(2,-2)$ and $(2,2)$, and the cross-section at y is shaped like the region in the xz-plane given by $|y| \le x \le 2$, $0 \le z \le x^2 - y^2$.