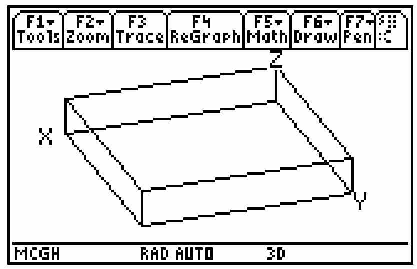
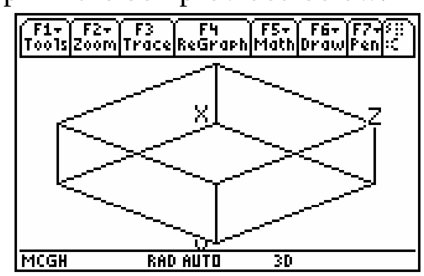
Assignment 29: Double Integrals (13.1-3) **Name________________________**
Please provide a handwritten response.

1. The double integral $\int_0^1 \int_0^{y^2} \frac{3}{4+y^3} dxdy$ is evaluated on your calculator as $\int\left(\int\left(3/\left(4+y\wedge 3\right),x,0,y\wedge 2\right),y,0,1\right)$. Evaluate this integral and record the result below.

2a. Sketch the graph of $z = x^2 \sin\left(\frac{\pi y}{6}\right)$ over $0 \le x \le 6, 0 \le y \le 6, 0 \le z \le 40$ from a standard view of $eye\theta = 70, eye\phi = 20, eye\Psi = 0$ on the axes provided. Be sure that you have $xgrid = 14, ygrid = 14$. From the format screen set the **Axes** to **BOX**.



Now regraph the function changing the window setting to $eye\theta = 135, eye\phi = 35, eye\Psi = 0$. Sketch the resulting graph in the box provided below.



2b. Riemann sums for the volume can be found using 4, 9, 16, 25, etc. squares. If you partition the region R into n^2 then $\Delta A_i = \frac{36}{n^2}$ for all i. For convenience you can label the center of each square as $(u_i, v_i), 1 \le i, j \le n$ so that $u_i = \frac{3}{n} + (i-1)\frac{6}{n}, 1 \le i \le n$ and $v_j = \frac{3}{n} + (j-1)\frac{6}{n}, 1 \le j \le n.$ Thus $V \approx \sum_{j=1}^{n}\sum_{i=1}^{n} f(u_i, v_j)\Delta A_i = \sum_{j=1}^{n}\sum_{i=1}^{n} u_i^2 \sin\frac{\pi v_j}{6}$. On your calculator you will want to **Define** $u = 3/n + (i-1)6/n$ and **Define** $v = 3/n + (j-1)6/n$. Then enter $(36/n\wedge 2)*\sum\left(\sum\left(u\wedge 2*\sin(\pi*v/6),i,1,n\right),j,1,n\right)$ and record your result below.

2c. You can readily compute this summation for various values of $\boldsymbol{n}$ by adding the $|\,\boldsymbol{n} = \_\_$ to the statement in **2b**. Fill in the table below by calculating the summation for the indicated values of $\boldsymbol{n}$.

n	$\sum_{j=1}^{n}\sum_{i=1}^{n} f(u_i, v_j)\Delta A_i$
2	
3	
6	
12	

2d. How large a value of $\boldsymbol{n}$ is needed to make the Riemann sum less than 275.03?

2e. The exact volume is given by $\int_0^6 \int_0^6 f(x, y)\,dxdy$. Evaluate this integral by entering $\int(\int(x \wedge 2 * sin(\pi * y/6), x, 0, 6), y, 0, 6)$. Record your result below.

3a. Graph $z = sin(x^2 + y^2)$ over $-2 \le x \le 2, -2 \le y \le 2, -1 \le z \le 1$. How would you describe the resulting surface? What part of the surface corresponds to $\int_{-2}^{2} \int_0^{\sqrt{4-x^2}} sin(x^2 + y^2)\,dydx$?

3b. Compute the double integral given in **3a** and record the results below. Be careful of the order of integration.

3c. Transform the integral to polar coordinates as $\int_0^2 \int_0^{\pi} r\,sin(r^2)\,d\theta dr$ and evaluate the resulting double integral. Record the answer below. Are the answers the same? Which method was easier for your calculator?