MATH S1202: Calculus IV **Name:** _____

Summer 2018

Exam Number 1

June 5, 2018

Time Limit: 95 minutes

Question	Points	Score
1	10	
2	10	
3	12	
4	12	
5	10	
6	14	
7	18	
8	14	
Total	100	

1. [10 points] Find the area of the region bounded by the curve $y = x^2$ and the lines $y = 0$ and $x = 1$.

2. **[10 points]** Compute the integral of $f(x, y) = \sqrt{1 + y^3}$ over the region D bounded by the curve $y = \sqrt{x}$ and the lines $y = 1$ and $x = 0$.

3. **[12 points]** Compute the volume of the solid region lying above the xy-plane and below the surface $z = \sqrt{1 - x^2 - y^2}$.

4. **[12 points]** Compute the surface area of the portion of the plane $z + 9x + 3y = 6$ lying in the first octant.

5. [10 points] Rewrite the iterated integral

$$\int_{-2}^{2}\int_{0}^{4-x^2}\int_{8-2y}^{8} f(x,y,z)\,dz\,dy\,dx$$

as an iterated integral in the order $dx\,dy\,dz$.

6. [14 points] Find the integral $\iiint_E (x^2 + y^2 + z^2)^{-1}\, dV$ where E is the region that lies above the cone $z = \sqrt{x^2 + y^2}$ and between the spheres $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$.

7. **[18 points]** Evaluate

$$\iint_R \frac{x-y}{x+y}\, dA$$

where R is the square with vertices $(1,0), (1/2,1/2), (1,1), (3/2,1/2)$.

(**7.** continued)

8. [14 points] Fix a point (a, b) in the plane. Compute the volume of the solid region lying in the cylinder $(x-a)^2+(y-b)^2=1$, above the xy-plane, and below the paraboloid $z=(x-a)^2+(y-b)^2$. (Hint: Consider the shifted polar coordinates $x = r\cos(\theta)+a$ and $y = r\sin(\theta)+b$.)

(**8.** continued)