Name: _____
Assessment 1
Math& 264: Multivariable Calculus

Instructions: Please carefully complete these questions by hand making sure to show all work. Upload your solutions to Gradescope by 8 am on Monday (4/13). During your presentation time, you will be asked to explain your thought process and reasoning on one randomly assigned question.

(1.1) Convert the equation $r = \dfrac{1}{2\cos\theta + 3\sin\theta}$ to Cartesian coordinates. Describe the resulting curve.

(1.2) Find the slope of the line tangent to $r = 8\sin\theta$ at the point $\left(4, \dfrac{5\pi}{6}\right)$

(1.3) Find the area of the region inside one leaf of $r = \cos(3\theta)$

(1.4) Find the area of the region that lies between $r = 1 + \sin\theta$ and $r = 1 + \cos\theta$

(1.5) Find the length of the complete cardioid $r = 4 + 4\sin\theta$

(1.6) Evaluate $I = \iint_R \frac{dA}{\sqrt{16 - x^2 - y^2}}$ where $R = \left\{ (x, y) : x^2 + y^2 \le 4, x \ge 0, y \ge 0 \right\}$

(1.7) Evaluate $I = \int_0^3 \int_0^{\sqrt{9-x^2}} \sqrt{x^2 + y^2}\, dy\, dx$

(1.8) Sketch and set up an iterated integral representing the region inside the limaçon $r = 1 + \frac{1}{2}\cos\theta$

(1.9) Use a double integral to find the area of the region bounded by the cardioid $r = 2(1 - \sin\theta)$

(1.10) Use a double integral to find the area of the region bounded by all leaves of $r = 2\cos(3\theta)$