Math 233 - Assignment 10

Name _____

April 18, 2024

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due April 25.

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1. Evaluate the iterated integral and sketch the region of integration.

$$\int_{-1}^{1} \int_{-x^2}^{x^2} (x^2 - y)\, dy\, dx$$

2. Reverse the order of integration and evaluate.

$$\int_{-1}^{0} \int_{-\sqrt{y+1}}^{\sqrt{y+1}} y^2\, dx\, dy$$

3. Evaluate the iterated integral by reversing the order of integration.

$$\int_{0}^{4} \int_{\sqrt{y}}^{2} e^{x^3}\, dx\, dy$$

4. Consider the double integral given below, where R is the plane region bounded by the graphs of $y = \sqrt{x}$, $y = 2$, and $x = 0$. Sketch the region R, write the double integral as an iterated integral in both orders, and evaluate either one of your iterated integrals.

$$\iint_R \sin y^3\, dA$$

5. Let E be the plane region between the graphs of $y = x^2$ and $y = x + 2$. Sketch the region E and write the iterated integral (in the $dy\, dx$ order) for the double integral given below. Evaluate your iterated integral and check your answer using a CAS.

$$\iint_E (xy + 5)\, dA,$$

6. Find the area of the upper half of the cardioid $r = 1 + \cos\theta$.

7. Convert to polar coordinates and evaluate.

$$\int_{0}^{2} \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} (x^2 + y^2)^2\, dx\, dy$$

8. Evaluate by converting to polar coordinates.

$$\int_{0}^{1} \int_{x}^{\sqrt{2-x^2}} (x + 2y)\, dy\, dx$$