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MA 510

Spring 2020

Homework 6

Due March 4th at the beginning of class, or by 12:30 pm in MATH 602. Justify your answers. Please let me know if you have a question or find a mistake.

1. Let $F(x, y) = (x + ax^2y^b, x^cy^3 + 3y^2)$ for some constants a, b, and c.

   (a) Find a, b, and c such that $F = \nabla f$ for some function $f(x, y)$.

   (b) For the choice of a, b, and c you found above, evaluate $\int_C F \cdot ds$, where C is the circular arc beginning at $(0, 0)$, passing through $(2, 10)$, and ending at $(1, 1)$.

2. Let D be the region between $y = 0$, $y = x^2$, and $x = 2$. Sketch D and evaluate

   $$\iint_D (x + y)\, dA.$$

3. Let D be the region between $x = y^2$ and $x = y^4$. Sketch D and evaluate

   $$\iint_D (1 + y^7 \cos(x^2)\sin^2(y)e^{x^4})\, dA.$$

4. Sketch the region of integration and evaluate

   $$\int_0^2 \int_{2x}^4 \sin(y^2)\, dy\, dx$$

   by interchanging the order of integration.

5. Sketch the region of integration and interchange the order of integration for

   $$\int_{-1}^1 \int_{|x|}^1 f(x, y)\, dy\, dx.$$