

Math 241 Fall 1999 exam 4



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PRINT Your Name: _____

There are 10 problems on 5 pages. Each problem is worth 10 points. SHOW your work. **CIRCLE** your answer. **NO CALCULATORS!**

1. Let $R = \{(x, y) \mid 1 \leq x \leq 4, 0 \leq y \leq 2\}$, and let

$$f(x, y) = \begin{cases} 2 & \text{if } 1 \leq x < 3, 0 \leq y \leq 2 \\ 3 & \text{if } 3 \leq x \leq 4, 0 \leq y \leq 2. \end{cases}$$

Find $\int \int_R f(x, y) dA$.

$$\begin{aligned} \int_0^2 \int_1^3 2 dx dy + \int_0^2 \int_3^4 3 dx dy &= 2 \cdot \text{area} \begin{array}{|c|c|} \hline 1 & 2 \\ \hline \end{array} + 3 \cdot \text{area of} \begin{array}{|c|c|} \hline 1 & 2 \\ \hline \end{array} \\ &= 2 \cdot 4 + 3 \cdot 2 \\ &= 8 + 6 \\ &= 14 \end{aligned}$$

$$\begin{aligned} 2. \text{ Find } \int_0^{\pi/2} \int_0^1 x \sin(xy) dy dx &= \int_0^{\pi/2} [-\cos(xy)]_0^1 dx = \int_0^{\pi/2} -\cos x + 1 dx \\ &= [-\sin x + x]_0^{\pi/2} = -1 + \frac{\pi}{2} \end{aligned}$$