Solutions

Math 397 Spring 2016
Section 4

Quiz 17

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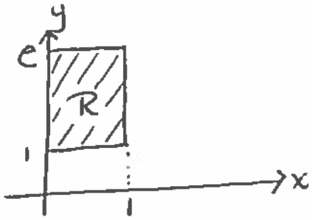
Show all work. Incomplete answers may receive little or no credit. You do not need to simplify your answers. All numerical answers should be exact, with no decimal approximations.

1. Calculate $\iint_R \frac{e^x}{y}\,dA$ where R is the rectangle given by $0 \le x \le 1$, $1 \le y \le e$.



$$\iint_R \frac{e^x}{y}\,dA = \int_0^1 \int_1^e \frac{e^x}{y}\,dy\,dx$$

$$= \int_0^1 e^x \cdot \ln|y| \Big|_1^e \,dx$$

$$= \int_0^1 e^x\,dx$$

$$= e^x \Big|_0^1$$

$$= e - 1$$

2. Use an iterated integral to find the volume of the solid that lies below $z = 6xy^2 + 4y + 4$ and above the rectangle given by $0 \le x \le 2$, $-1 \le y \le 1$.

$$V = \iiint_V dV$$

$$= \int_{-1}^1 \int_0^2 \int_0^{6xy^2+4y+4} dz\,dx\,dy$$

$$= \int_{-1}^1 \int_0^2 6xy^2 + 4y + 4\,dx\,dy$$

$$= \int_{-1}^1 3x^2y^2 + 4xy + 4x \Big|_0^2 \,dy$$

$$= \int_{-1}^1 12y^2 + 8y + 8\,dy$$

$$= \int_{-1}^1 12y^2 + 8\,dy + \underbrace{\int_{-1}^1 8y\,dy}_{=0}$$

$$= 2\Big[4y^3 + 8y\Big]_0^1$$

$$= 2\big[4 + 8\big] = 24$$