# Section 29.4: cont'd

Monday, January 30, 2017 1:12 PM

Mini quiz on Wednesday

- evaluate a double integral

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last time, we ended up with:

$$\int_0^2 \int_0^{2-x} (2-x-y)\, dy\, dx$$

$$= \int_0^2 \left[ \left( 2y - xy - \frac{y^2}{2} \right) \Big|_0^{2-x} \right] dx$$

$$= \int_0^2 \left[ 2(2-x) - x(2-x) - \frac{(2-x)^2}{2} \right] dx$$

$$= \int_0^2 \left[ (2-x)^2 - \frac{(2-x)^2}{2} \right] dx$$

$$= \int_0^2 \frac{(2-x)^2}{2}\, dx$$

$$= -\frac{(2-x)^3}{2 \cdot 3} \Big|_0^2$$

$$= 0 + \frac{2^3}{6}$$

$$a^2 - \frac{a^2}{2} = \frac{2a^2}{2} - \frac{1a^2}{2} = \frac{a^2}{2}$$

$$= -\frac{(2-x)^3}{2\cdot 3}\Big|_0^2$$

$$= 0 + \frac{2^3}{6}$$

$$= \frac{8}{6} = 4/3$$

$\frac{2}{2} - \frac{1}{2} = \frac{1}{2}$

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note $\int_0^2 \frac{(2-x)^3}{2}\,dx$

let $u = 2-x$

$du = -dx$

$$= \int_{x=0}^{x=2} -\frac{u^3}{2}\,du$$

$$= -\frac{u^3}{2\cdot 3}\Big|_{x=0}^{x=2}$$

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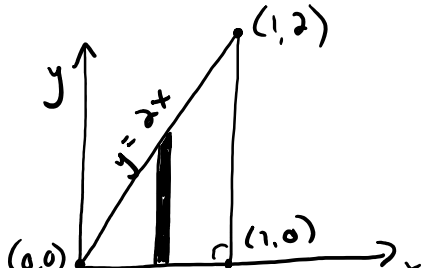
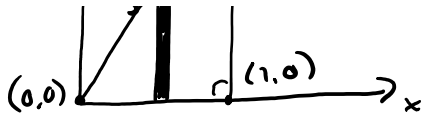
example: evaluate the integral $I = \iint_T xy\,dA$

over the triangle T with vertices (0, 0), (1, 0) and (1, 2).

step 1: draw the region in the xy plane




or





step 2: choose a slice and set up limits

method #1: vertical slice

$T: \quad 0 \le x \le 1$
$\quad\quad 0 \le y \le 2x$

method #2: horizontal

$0 \le y \le 2$
$y/2 \le x \le 1$

step 3: set up integral

method #1:

$$I = \iint_T xy \, dA$$

$$= \int_0^1 \int_0^{2x} xy \, dy \, dx$$

$$= \int_0^1 \left[ \frac{xy^2}{2} \Big|_0^{2x} \right] dx$$

$$= \int_0^1 \left[ \frac{x(2x)^2}{2} - 0 \right] dx$$

$$= \int_0^1 2x^3 \, dx$$

$$= \frac{2x^4}{4} \Big|_0^1$$

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