Double Integrals

(Anti-Derivative) $\iint f(x,y)\,dA$ indefinite

(Volume) $= \iint_R f(x,y)\,dA$ definite

Ex

$z = f(x,y)$

$z = 3x + 2y + 10$

$$\iint_R (3x+2y+10)\,dA$$

$R = \{(x,y) \mid 0 \le x \le 10, 0 \le y \le 15\}$

$$\int_{y=0}^{15}\left[\int_{x=0}^{10} 3x+2y+10\;dx\right]dy$$

$$\int_0^{15}\left[\frac{3x^2}{2}+2xy+10x\Big|_0^{10}\right]dy$$

$$\int_0^{15}\left[150+20y+100-0-0-0\right]dy$$

$$\int_0^{15} 250 + 20y \, dy = 6600$$

250

$$250y + \frac{20y^2}{2}\Big|_0^{15}$$

$$250 \cdot 15 + 10 \cdot 15^2 = 6600$$

Anti-derivative $\iint x^2 + 2xy + \sin(xy) \, dA$

$dx \cdot dy$

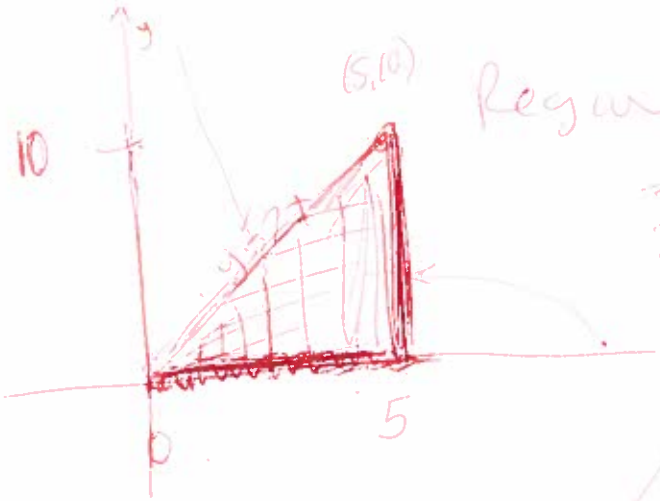
$dy \cdot dx$

$$\iint \left(x^2 + 2xy + \sin(xy)\right) dx \, dy$$

$$\int \left(\frac{x^3}{3} + 2y\frac{x^2}{2} + \frac{x\sin(y)}{y}\right) dy$$

$$\frac{x^3}{3}y + \frac{y^2x^2}{2} + -x\cos(y)$$

$+C$



Region

$z = f(x,y) = x + 2y$

$$\iint_R f(x,y)\, dA$$

$$\int_{x=0}^{5} \int_{y=0}^{2x} x + 2y \; dy\, dx$$

$$\int_{x=0}^{5} \int_{\substack{y=f(x) \leftarrow \text{top function} \\ y=g(x) \leftarrow \text{bottom function}}} (x + 2y)\, dy$$

$$\int_0^5 \left(xy + y^2 \Big|_{y=0}^{2x} \right)$$

$$\int_0^5 2x^2 + 4x^2 \; dx$$

$du = dx$

$$2x^3 \Big|_0^5 = 250$$

$$\int_{y=0}^{10} \int_{x=y/2}^{x=5} x + 2y \; dx \; dy$$

$(y = 2x)$

$x = y/2$

$$\int_0^{10} \left[\frac{x^2}{2} + 2xy \Big|_{y/2}^{5} \right] dy$$

$$\int_0^{10} \left(\frac{25}{2} + 10y \right) - \left(\frac{y^2}{8} + y^2 \right) dy$$

$$\frac{25}{2} y + 5y^2 - \frac{y^3}{24} - \frac{y^3}{3} \Big|_0^{10}$$

$$\frac{250}{2} + 500 - \frac{1000}{24} - \frac{1000}{3} = 250$$

GROUP NAME: Engineers Logo:	Student Names (First and Last) Speaker/Presenter: _____
Date: _____ Topics:	Writer/Prep: _____ QC/Leader: _____

Instructions:

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Amanda Fox
Date: 10/15/13	Writer/Prep: Olga Smith
Topics: Double Integrals	QC/Leader:

Instructions:

$z = 28.39x + 113.5y - 11501.5 = f(x,y)$

$\iint f(x,y)\,dA$ → mistake here

$\int_0^{100}\int 28.39x + 113.5y + 11501.5\,dy\,dx$

$= 28.39xy + \frac{113.5y^2}{2} - 11501.5y + C_x \Big|_0^{100}$

$= 2839x + \frac{1135000}{2} - 11501.5(100) = 2839x + 582650$

$\int_0^{100} 2839x - 582650\,dx = \frac{2839x^2}{2} + 582650x + C_x \Big|_0^{100}$

$= \frac{28390000}{2} + 582650(100) = -44070000$

Should be 1.86×10^8 by Wolfram

GROUP NAME: Bio	Student Names (First and Last)
Logo:	Speaker/Presenter: Piyush
Date: 2/20	Writer/Prep: Shruti
Topics:	QC/Leader: James

Instructions:

$z = 1.53x + .96y + 9.517$

$R = \{(x,y) \mid 0 \le x \le 5, 0 \le y \le 5\}$

$$\iint 1.53x + .96y + 9.5 \, dx\,dy$$

$$= \int_0^5 \left(\frac{1.53x^2}{2} + .96xy + 9.5y \right) \Big|_0^5 dy$$

$$\int_0^5 (9.\ldots + 4\ldots y + 47.585) dy$$

$$\int_0^5 4.8y + 66.7 \, dy$$

$$= \frac{4.8y^2}{2} + 66.7y \Big|_0^5$$

$$= 60 + 333.55 - 0 - 0$$

$$= 393.55$$

GROUP NAME: **Logo:**	**Student Names (First and Last)** **Speaker/Presenter:** **Writer/Prep:** **QC/Leader:**
Date: **Topics:**	

Instructions:

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