

Problem Set # 2 (Fri 03 Feb 2012) Solutions

1. CM 14.2

- Exercise 28

**Solution.**

$$\frac{\partial}{\partial x} \ln(ye^{xy}) = \frac{\frac{\partial}{\partial x} ye^{xy}}{ye^{xy}} = \frac{y^2 e^{xy}}{ye^{xy}} = y$$

- Problem 40

**Solution.** Well,  $f(65, 160) = \frac{1}{100} \cdot 65^{1/4} \cdot 160^{3/4} \approx 1.28$ , this means that a person weighing  $65kg$  ( $\approx 143lb$ ) and  $160cm$  ( $\approx 5'3''$ ) has about  $1.28 m^2$  ( $\approx 13.78 ft^2$ ) of skin.

Now calculate

$$\frac{\partial f}{\partial w} \Big|_{(w,h)} = \frac{1}{100} \frac{1}{4} w^{-3/4} h^{3/4} = \frac{1}{400} \left(\frac{h}{w}\right)^{3/4}, \quad \frac{\partial f}{\partial h} \Big|_{(w,h)} = \frac{1}{100} w^{1/4} \frac{3}{4} w^{-1/4} = \frac{3}{400} \left(\frac{w}{h}\right)^{1/4}$$

so that  $\frac{\partial f}{\partial w} \Big|_{(65,160)} \approx 0.005$  and  $\frac{\partial f}{\partial h} \Big|_{(65,130)} \approx 0.006$ . This means that for every  $kg$  of weight, the skin surface area is increased by  $0.005 m^2$  and for every  $cm$  of height, the skin surface area is increased by  $0.006 m^2$ . Crazy!

2. CM 14.3

- Exercise 2

**Solution.**  $ex - z = 0$

- Exercise 4

**Solution.**  $6y - z = 9$

- Exercise 8

**Solution.**  $9x + 80y + 4z = 64$