

## MA122 Practice Problem Set 8

1. #44 in section 8-1

Answer: (a) In the plane  $x = c$ ,  $c$  any constant,  $z = 4 - \sqrt{4 - y^2}$ ; (b) the empty set; (c) the upper half of a right circular cylinder of radius 2 whose axis is the  $x$ -axis

2. #48 in section 8-1

Answer: (a)  $a^2 + b^2 = c^2 + d^2 = r^2$ ; (b) the union of two rays with vertex  $(0, 0, 4)$ ; a cone with vertex  $(0, 0, 4)$  and the axis the  $z$ -axis which opens downward.

3. In Section 8-2, solve

(a) # 12

Answer: 4

(b) # 14

Answer: -6

(c) # 16

Answer: -2.5

(d) # 30

Answer:  $-\frac{3}{x^2y^2}$

(e) # 34

Answer:  $32x(1 + 2xy^2)^6(1 + 30xy^2)$

(f) # 68

Answer:  $f_{xx} = \frac{2}{y} - \frac{2y^2}{x^3}$ ;  $f_{xy} = f_{yx} = -\frac{2x}{y^2} + \frac{2y}{x^2}$ ;  $f_{yy} = \frac{2x^2}{y^3} - \frac{2}{x}$

(g) # 69

Answer: see answer at the back of the textbook

(h) # 86

Answer: 60; -20

4. In Section 8-3, solve

(a) # 20

Answer: saddle point at  $(0, 0)$ ;  $f(-4, -16) = 256$  and  $f(4, 16) = 256$  are local maxima

(b) # 24

Answer: saddle point at  $(2.373, 0.475)$ ;

(c) # 28

Answer: (b) saddle point

(d) # 32

Answer: (a) when  $p = 40$  and  $q = 50$ ,  $x = 20$ ,  $y = 45$ ; when  $p = 45$  and  $q = 55$ ,  $x = 5$ ,  $y = 40$ ; (b) a maximum daily profit of 1200 dollars is realized for  $p = 40$  and  $q = 50$ .

(e) # 38

Answer: 12 in. by 12 in. by 12 in.