

## HW 1 Solutions

Q1.1

$$Q1 \quad f(5,0) = 25, \quad f(5,-2) = 5^2 - 3 \cdot 5 \cdot (-2) - (-2)^2 = 51$$

$$f(a,b) = a^2 - 3ab - b^2$$

$$Q2 \quad g(2,3,4) = \frac{2}{3-4} = -2, \quad g(7,46,44) = \frac{7}{46-44} = \frac{7}{2}$$

Q5

$$f(2+h,3) - f(2,3) = (2+h) \cdot 3 - 2 \cdot 3 = 6 + 3h - 6 = 3h$$

$$Q6 \quad f(2,3+k) - f(2,3) = 2 \cdot (3+k) - 2 \cdot 3 = 6 + 2k - 6 = 2k$$

Q7

$$C(x,y,z) = 3xy + 3xy + 5xz + 5xz + 5yz + 5yz \\ = 6xy + 10xz + 10yz$$

Q9

$$f(8,1) = 20 \cdot 8^{1/3} \cdot 1^{2/3} = 40, \quad f(1,27) = 20 \cdot 1^{1/3} \cdot 27^{2/3} = 20 \cdot 1 \cdot 9 = 180$$

$$f(8,27) = 20 \cdot 8^{1/3} \cdot 27^{2/3} = 20 \cdot 2 \cdot 9 = 360$$

$$f(8k, 27k) = 20 \cdot (8k)^{1/3} \cdot (27k)^{2/3} = 20 \cdot 8^{1/3} \cdot k^{1/3} \cdot 27^{2/3} \cdot k^{2/3} \\ = k \cdot 20 \cdot 8^{1/3} \cdot 27^{2/3} = k \cdot f(8,27)$$

Q12

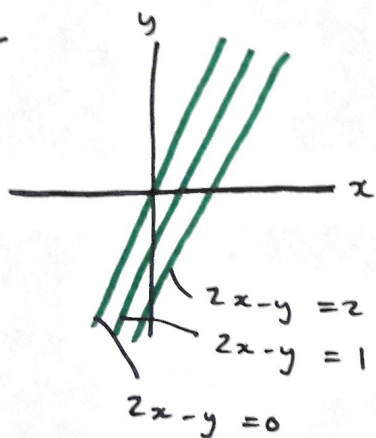
$$C(x,y) = 100x + 200y$$

Q13 a)  $T = f(2.5, 200,000, 5000) = \frac{2.5}{100} \cdot ((0.40) \cdot (200,000) - 5000)$   
 $= \$1875$

b)  $T = f(3, 200,000, 5000) = \frac{3}{100} \cdot ((0.40) \cdot (200,000) - 5000)$   
 $= \$2250$

$\$2250 = 1.2 \times \$1875 \Rightarrow$  Yes tax increases by 20%

Q15

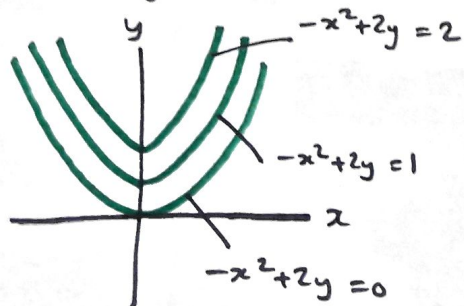


$$2x - y = 0 \Rightarrow y = 2x$$

$$2x - y = 1 \Rightarrow y = 2x - 1$$

$$2x - y = 2 \Rightarrow y = 2x - 2$$

Q16



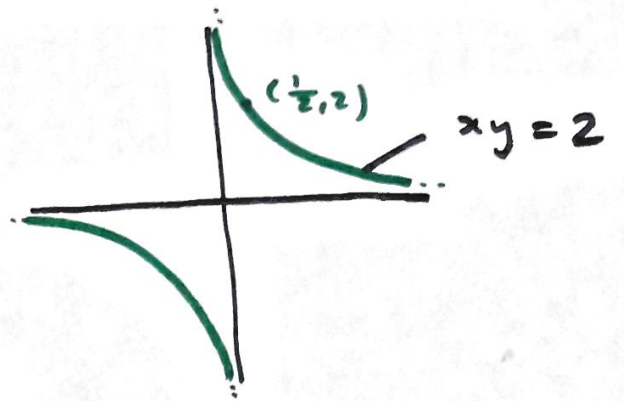
$$-x^2 + 2y = 0 \Rightarrow y = \frac{x^2}{2}$$

$$-x^2 + 2y = 1 \Rightarrow y = \frac{x^2}{2} + \frac{1}{2}$$

$$-x^2 + 2y = 2 \Rightarrow y = \frac{x^2}{2} + 1$$

Q18  $f(\frac{1}{2}, 4) = \frac{1}{2} \cdot 4 = 2$

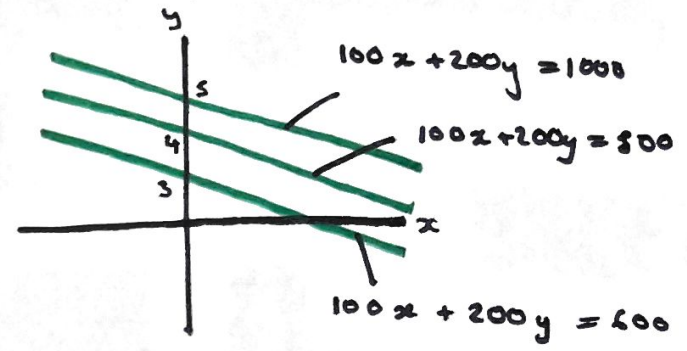
$f(x, y) = 2 \Rightarrow xy = 2 \Rightarrow y = \frac{2}{x}$



Q22  $100x + 200y = 600 \Rightarrow y = \text{[scribble]} - \frac{1}{2}x + 3$

$100x + 200y = 800 \Rightarrow y = -\frac{1}{2}x + 4$

$100x + 200y = 1000 \Rightarrow y = -\frac{1}{2}x + 5$



Q23 (d)

Q24 (b)

Q25 (c)

Q26 (a)