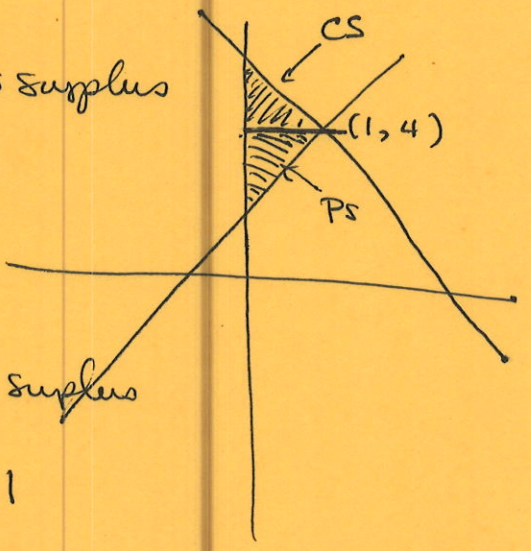
MAT 230 Written Homework #9 Key

1. $D(x) = -3x+7$, $S(x) = 2x+2$

$\int_0^1 (-3x+7) - 4 \, dx =$ Consumer's surplus

$\int_0^1 -3x+3 \, dx = -\frac{3}{2}x^2+3x \Big|_0^1 =$

$-\frac{3}{2}+3 = \frac{3}{2}$



$\int_0^1 4-(2x+2) \, dx =$ producer's surplus

$\int_0^1 2-2x \, dx = 2x-x^2 \Big|_0^1 = 2-1 = 1$

2. a. $\frac{dy}{dx} = 5x^4 y \Rightarrow \int \frac{dy}{y} = \int 5x^4 \, dx \Rightarrow \ln y = x^5 + C \quad A = e^C$

$y = e^{x^5+C} = Ae^{x^5}$

$500 = Ae^0 \Rightarrow A = 500$ $\quad y = 500e^{x^5}$

b. $y' = 2x - xy \Rightarrow y' = x(2-y) \Rightarrow y' = -x(y-2)$

$\int \frac{dy}{y-2} = \int -x \, dx \Rightarrow \ln(y-2) = -\frac{1}{2}x^2 + C$ $\quad A = e^C$

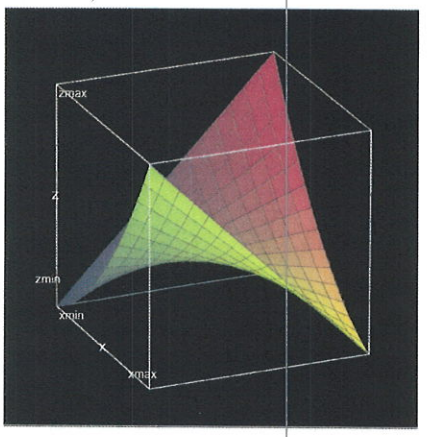
$y-2 = e^{-\frac{1}{2}x^2+C} = Ae^{-\frac{1}{2}x^2}$

$y = Ae^{-x^2/2} + 2$

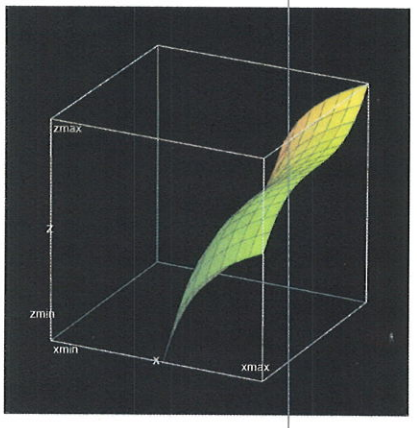
$9 = Ae^0 + 2 \Rightarrow A = 7$

$y = 7e^{-x^2/2} + 2$

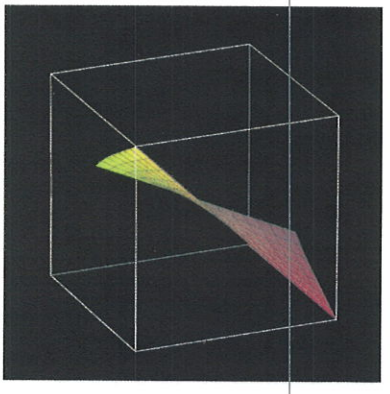
3a.



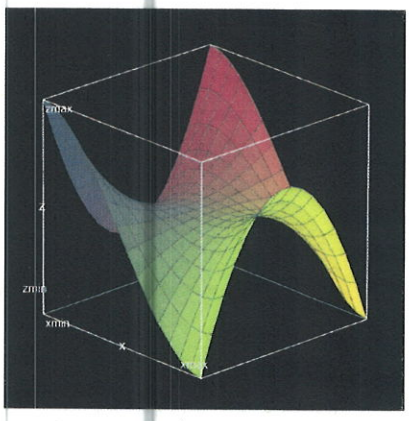
3b.



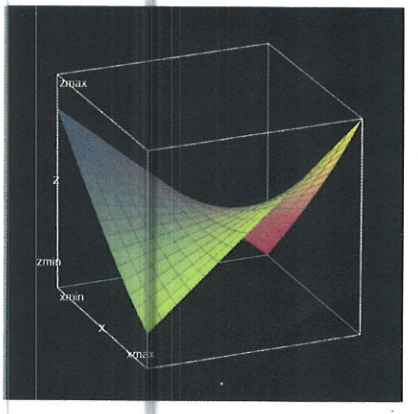
3c.



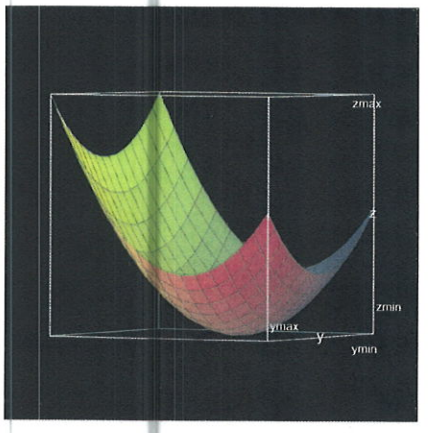
3d.



3e.



3f.



3g.