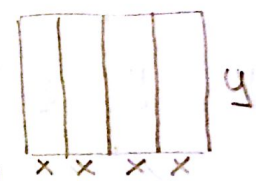
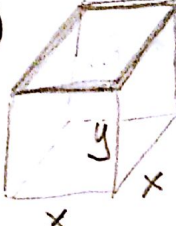


① $x + y = 9$ $x \cdot y^2 = M$
 $x = 9 - y$ $(9 - y)y^2 = M$
 $9y^2 - y^3 = M$
 $\frac{dM}{dy} = 18y - 3y^2 = 0$
 $3y(6 - y) = 0$
 $y = 6$
 $x = 3$

② $8x + 5y = 500$ $A = 4xy$
 $8x = 500 - 5y$
 $x = \frac{500 - 5y}{8}$
 $A = 4 \left(\frac{500 - 5y}{8} \right) y$
 $A = \frac{(2000 - 20y)}{8} y$

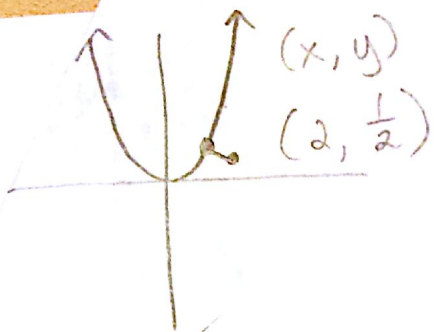


$A = \frac{2000y - 20y^2}{8}$
 $A = \frac{1}{8}(2000y - 20y^2)$
 $\frac{dA}{dt} = \frac{1}{8}(2000 - 40y) = 0$
 $2000 = 40y$
 $y = 50$
 $x = 31.25 \cdot 4 = 125$

③ 
 $V = x \cdot x \cdot y$ $SA = 4xy + x^2$
 $48 = 4xy + x^2$
 $\frac{48 - x^2}{4x} = \frac{4xy}{4x}$
 $y = \frac{48 - x^2}{4x}$

$V = \left(\frac{48 - x^2}{4x} \right) \cdot x^2$
 $V = \frac{48x^2 - x^4}{4x}$

$\frac{dV}{dx} = \frac{4x(96x - 4x^3) - (48x^2 - x^4)(4)}{(4x)^2}$
 $= \frac{384x^2 - 16x^4 - 192x^2 + 4x^4}{16x^2}$
 $-12x^4 + 192x^2 = 0$
 $-12x^2(x^2 - 16) = 0$
 $x = 4$
 $y = 2$



4

$$y = x^2$$

$$d = \sqrt{(x-2)^2 + (y-\frac{1}{2})^2}$$

$$d = (x-2)^2 + (x^2 - \frac{1}{2})^2$$

$$\frac{dd}{dx} = 2(x-2) \cdot 1 + 2(x^2 - \frac{1}{2}) \cdot 2x$$

$$\frac{dd}{dx} = 2x - 4 + 4x(x^2 - \frac{1}{2})$$

$$\frac{dd}{dx} = \cancel{2x} - 4 + 4x^3 - \cancel{2x}$$

$$\frac{dd}{dx} = 4x^3 - 4 = 0$$

$$4x^3 = 4$$

$$x^3 = 1$$

$x = 1$ $y = 1$
