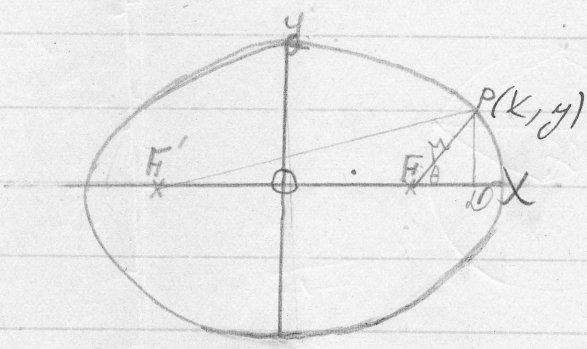
Lee
(1)

Examination ——— Intermediate Math.

I.



$OF = c = ae$; $OX = a$

$PF = r = a - ey$ (1); By previous demons.

$x = OD = OF + FD = ae + r\cos\theta$

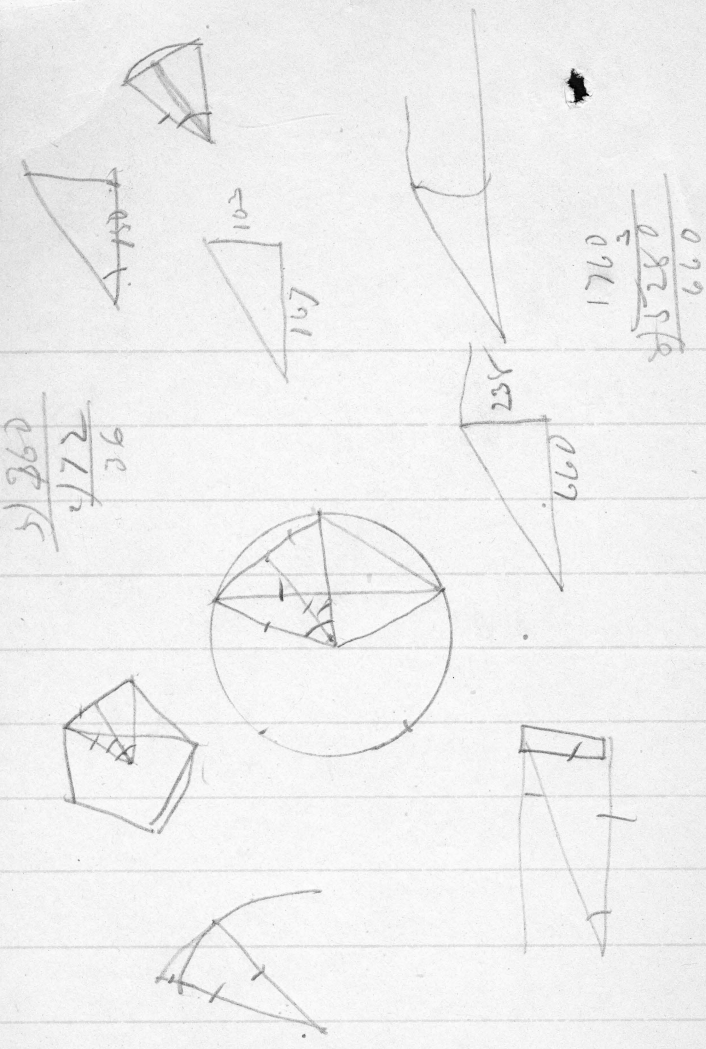
Subt. (1) $r = a - ae^2 - re\cos\theta$

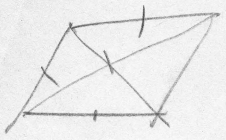
$r(1 + e\cos\theta) = a(1 - e^2)$

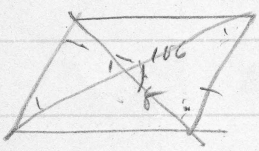
$r = \dfrac{a(1-e^2)}{1+e\cos\theta}$ Ans.

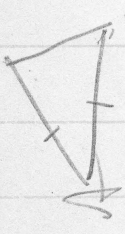
(4)

4
12
0
12
11
11
2
52









$y^3 = cx$ $\quad y = c^{\frac{1}{3}} x^{\frac{1}{3}}$

$y^2 = c^{\frac{2}{3}} x^{\frac{2}{3}}$

$V = \pi \int y^2 \, dx$

$V = \pi c^{\frac{2}{3}} \int x^{\frac{2}{3}} \, dx$

$= \pi c^{\frac{2}{3}} \frac{3}{5} x^{\frac{5}{3}} = \frac{3}{5} \pi c^{\frac{2}{3}} x^{\frac{3}{3}} x$

$= \frac{3}{5} \pi y^2 x$

$y^2 = 2px$

$\pi \int y^2 \, dx = 2\pi p \int x \, dx$

$= 2\pi p \frac{x^2}{2} = \pi p x^2$

$= \frac{1}{2}(2px)\pi x = \frac{1}{2} \pi y^2 x$

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$\frac{x^2}{a^2} = \frac{b^2 - y^2}{b^2}$

$x^2 = \frac{a^2}{b^2}(b^2 - y^2)$

$y^2 - b^2 = ax^2$ $\quad x^2 = \frac{y^2 - b^2}{a^2}$

$V = \pi \int x^2 \, dy$

$V = \pi \frac{a^2}{b^2} \int (b^2 - y^2) \, dy$

$= \pi \frac{a^2}{b^2} \left[b^2 y - \frac{y^3}{3} \right] = \pi \frac{a^2}{b^2} \left[b^3 - \frac{b^3}{3} \right)$

$= \pi \frac{a^2}{b^2} \frac{2}{3} b^3 = \frac{2}{3} \pi a^2 b$

$V = \pi \int x^2 \, dy = \frac{\pi}{a^4} \int (y^2 - b^2)^2 \, dy =$

$\frac{\pi}{a^4} \int ($

$y^2 - b^2 = ax^2$

$2y \frac{dy}{dx} = \frac{1}{2} a x^{-\frac{1}{2}}$

$2y \frac{dy}{dx} = \frac{a}{2\sqrt{x}}$ $\quad \frac{dy}{dx} = \frac{a}{4y\sqrt{x}}$

$y^2 - b^2 = ax^{\frac{1}{2}}$ $\quad y^2 = b^2 + ax^{\frac{1}{2}}$

$x = 0$
$y = \pm b$

$y = 0 \quad -b^2 = ax^{\frac{1}{2}}$

$b^4 = a^2 x$

$x = \frac{b^4}{a^2}$