① Choose $a = 10$, $b = 5$

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

$$\implies \frac{y}{b} = \pm\sqrt{1 - \frac{x^2}{a^2}}$$

$$y = \pm b\sqrt{1 - \frac{x^2}{a^2}} = \pm 5\sqrt{1 - \frac{x^2}{100}}$$

$x = 0 \implies y = \pm 5$

~~$x = ~~~~~~~~~~~~$~~
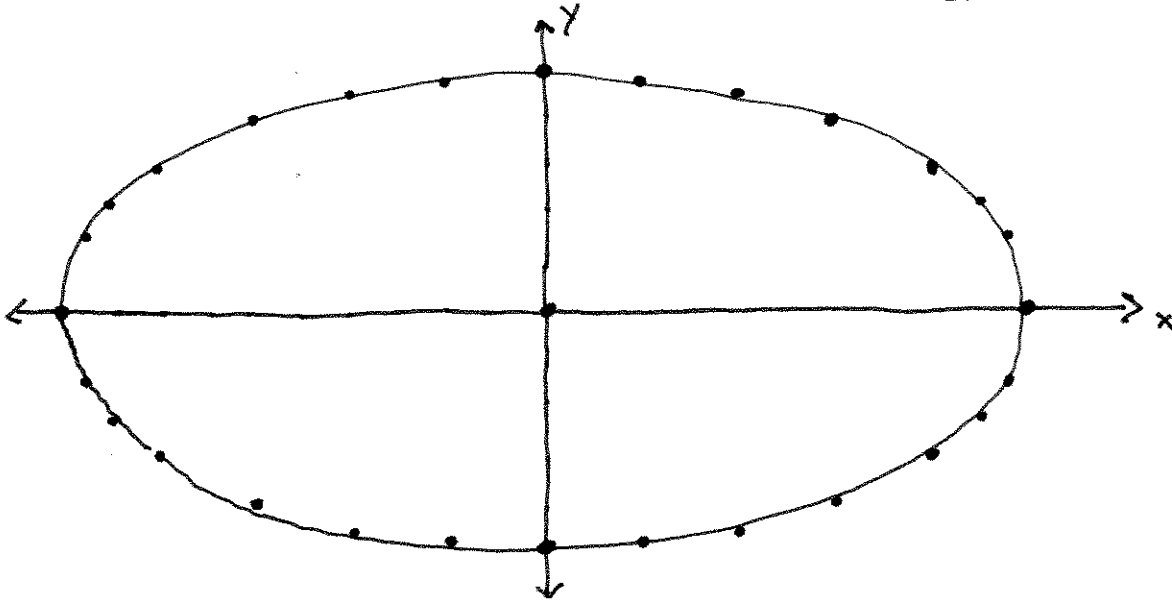
$x = 2 \implies y = \pm 4.9$

$x = 4 \implies y = \pm 4.6$

$x = 6 \implies y = \pm 4$

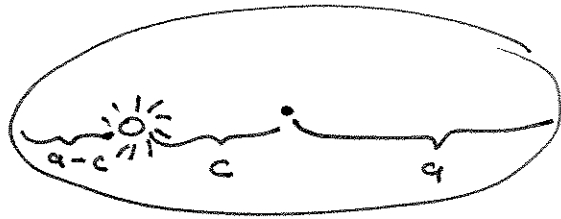$x = 8 \implies y = \pm 3$ $x = 9 \implies y = 2.2$

$x = 10 \implies y = 0$ $x = 9.5 \implies y = 1.6$

same y values
for negative x

$$e = \sqrt{1 - \frac{b^2}{a^2}} = \sqrt{1 - \frac{25}{100}} = \sqrt{\frac{3}{4}} = 0.87$$

② Pluto's orbit is nearly circular 🙂

⇒ easier to measure largest, smallest distance to sun

▸ longest dist $= a+c \approx 1.1$ in

shortest dist $= a-c \approx 0.75$ in

⇒ $2a = 1.1 + 0.75 = 1.85$ ⇒ $a = 0.93$

$2c = 1.1 - 0.75 = 0.18$ ⇒ $c = 0.088$

~~(scribbled out)~~

$c = \sqrt{a^2 - b^2}$ ⇒ $c^2 = a^2 - b^2$

⇒ $b^2 = a^2 - c^2$

⇒ $e = \sqrt{1 - \dfrac{a^2 - c^2}{a^2}} = 0.095$

Ellipses in assignment: just measure longest and shortest axes ($= 2a$ and $2b$ respectively)

first ellipse: $2a = \dfrac{13}{4}$ in   ⇒ $a = 1.6$ in

"○" $2b = \dfrac{7.5}{4}$ in   ⇒ $b = 0.94$ in

⇒ $e = \sqrt{1 - \dfrac{b^2}{a^2}} = 0.81$

second ellipse: $2a = \dfrac{17}{4}$ in ⇒ $a = 2.1$ in

"⬭" $2b = \dfrac{2.5}{4}$ in ⇒ 0.31 in

⇒ $e = 0.99$