10.5: 14. $100x^2 + 36y^2 = 225$

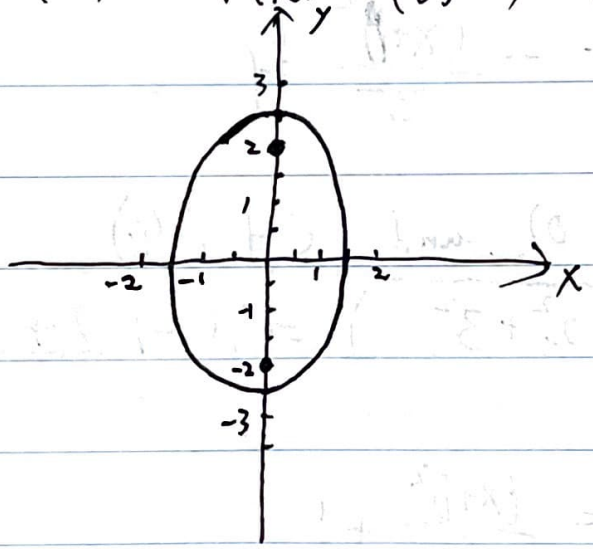
$$\frac{100}{225}x^2 + \frac{36}{225}y^2 = 1$$

$$\frac{x^2}{\frac{225}{100}} + \frac{y^2}{\frac{225}{36}} = 1$$

$$\frac{x^2}{\left(\frac{15}{10}\right)^2} + \frac{y^2}{\left(\frac{15}{6}\right)^2} = 1$$

vertices: $\left(0, \pm\frac{15}{2}\right)$

foci: $\left(0, \pm\sqrt{\left(\frac{15}{10}\right)^2 - \left(\frac{15}{6}\right)^2}\right) = (0, \pm 2)$



10.5: 24. $9y^2 - 4x^2 - 36y - 8x = 4$

$9(y^2 - 4y) - 4(x^2 + 2x) = 4$

$9(y^2 - 4y + 4) - 36 - 4(x^2 + 2x + 1) + 4 = 4$

$9(y-2)^2 - 4(x+1)^2 = 36$

$\frac{(y-2)^2}{2^2} - \frac{(x+1)^2}{3^2} = 1$

vertices: $(-1, 0)$ and $(-1, 4)$

foci: $(-1, \frac{4-0}{2} \pm \sqrt{2^2+3^2}) = (-1, 2 \pm \sqrt{13})$

asymptotes: $\frac{(y-2)^2}{2^2} = \frac{(x+1)^2}{3^2} + 1$

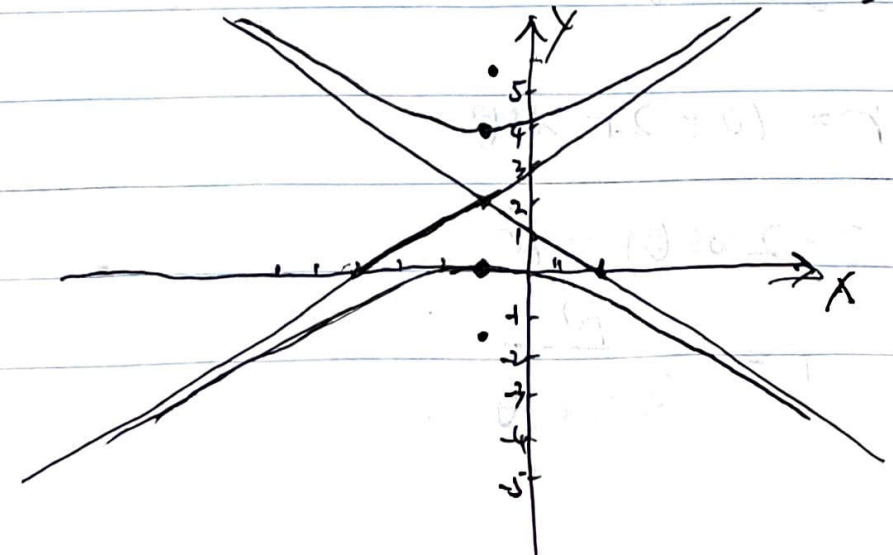
$\frac{y-2}{2} = \pm\sqrt{\frac{(x+1)^2}{3^2} + 1}$

$\frac{y}{2} - 1 = \pm\frac{x+1}{3}\sqrt{1 + \frac{9}{(x+1)^2}}$

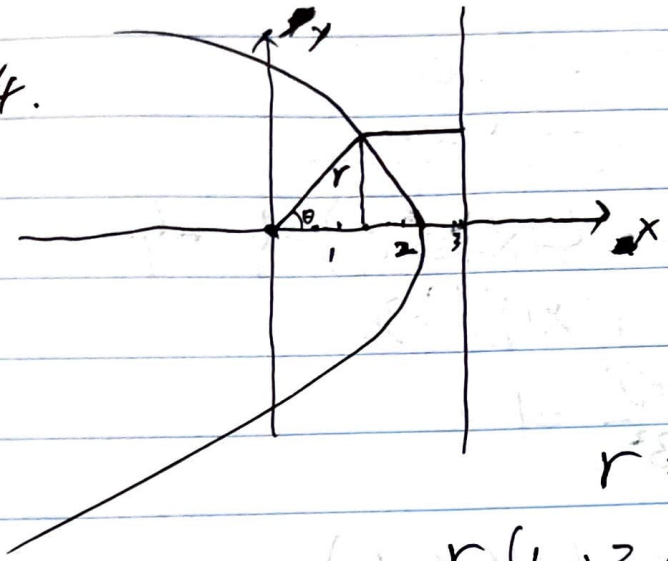
$\lim_{x\to\infty}\left(\frac{y}{2} - 1 = \pm\left(\frac{1}{3}x + \frac{1}{3}\right)\sqrt{1 + \frac{9}{(x+1)^2}}\right) = \pm\left(\frac{1}{3}x + \frac{1}{3}\right)$

1st asymptote: $\frac{y}{2} = \frac{1}{3}x + \frac{1}{3} + 1 \Rightarrow y = \frac{2}{3}x + \frac{8}{3}$

2nd asymptote: $\frac{y}{2} = -\frac{1}{3}x - \frac{1}{3} + 1 \Rightarrow y = -\frac{2}{3}x + \frac{4}{3}$



10.6: 4.



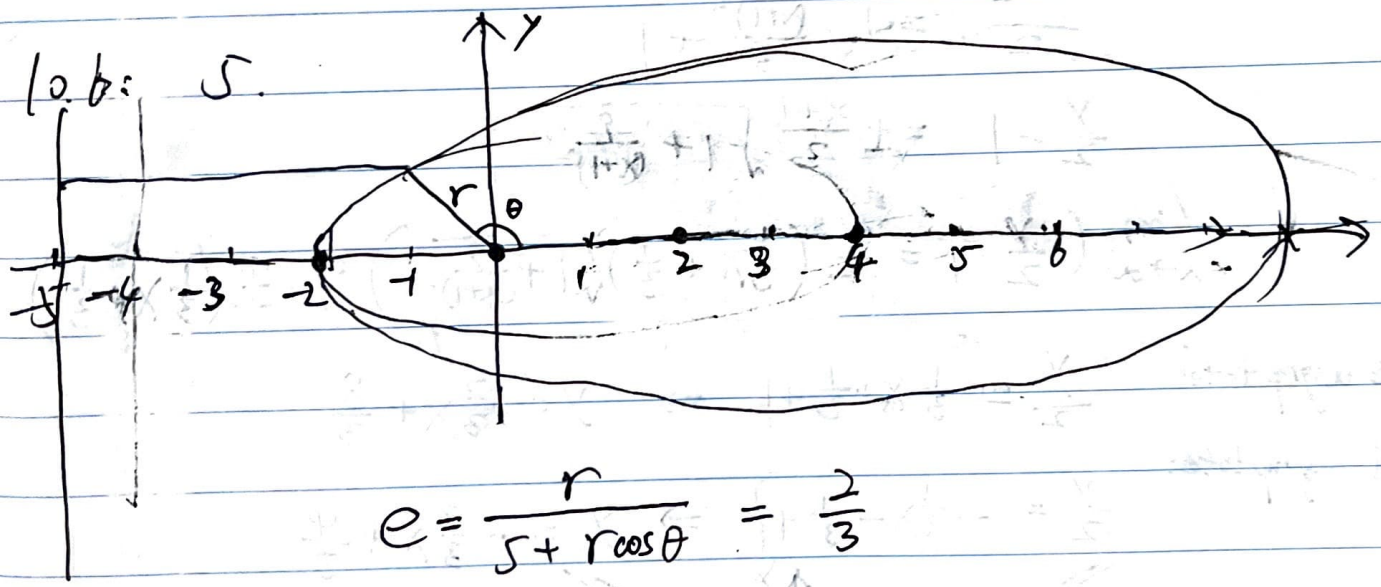
$$e = \frac{r}{3 - r\cos\theta} = 3$$

$$r = 9 - 3r\cos\theta$$

$$r(1 + 3\cos\theta) = 9$$

$$r = \frac{9}{1 + 3\cos\theta}$$

10.6: 5.



$$e = \frac{r}{5 + r\cos\theta} = \frac{2}{3}$$

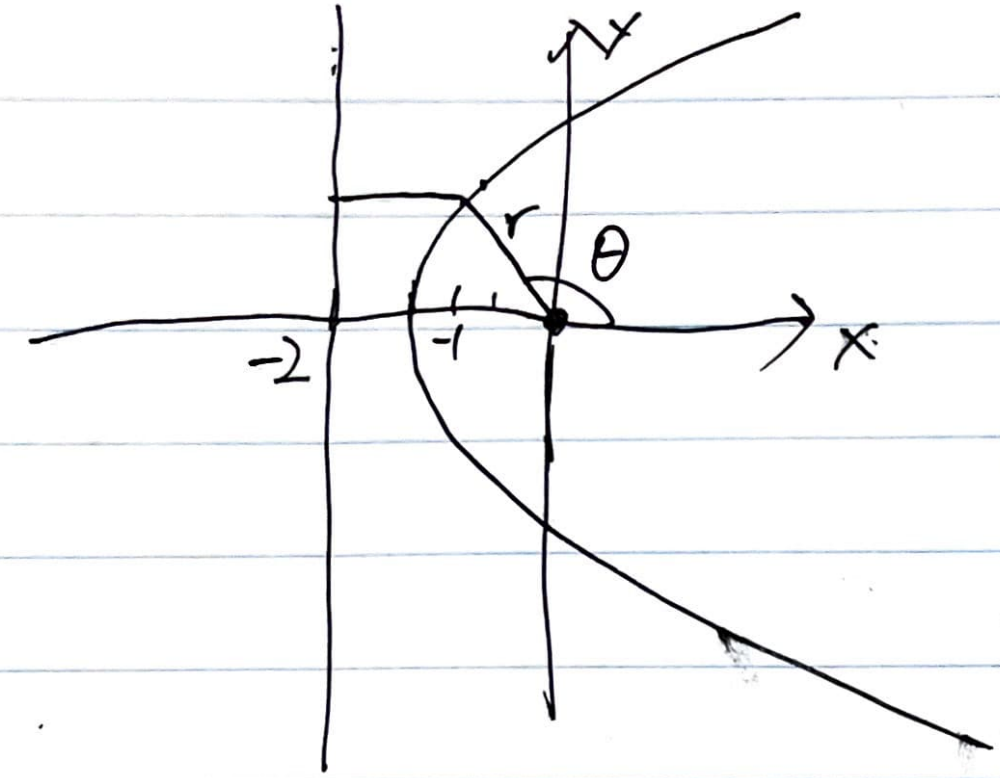
$$3r = 10 + 2r\cos\theta$$

$$r(3 - 2\cos\theta) = 10$$

$$r = \frac{10}{3 - 2\cos\theta}$$

10.6: 8. $r = -2\sec\theta = \frac{-2}{\cos\theta}$

$-2 = r\cos\theta = x$



$e = 2 = \frac{r}{2 + r\cos\theta}$

$r = 4 + 2r\cos\theta$

$r(1 - 2\cos\theta) = 4$

$r = \frac{4}{1 - 2\cos\theta}$