# In class practice problems: Hyperbolas (part 2)

① $\frac{(x-1)^2}{9} - \frac{(y-3)^2}{4} = 1$

$9 + 4 = c^2$

$13 = c^2$

$\pm\sqrt{13} = c$

C: $(1, 3)$ V: $(-2, 3)$ $(4, 3)$

CV: $(1, 1)$ $(1, 5)$

F: $(1 \pm \sqrt{13}, 3)$

Asym: $y = \frac{2}{3}x + \frac{7}{3}$

$y = -\frac{2}{3}x + \frac{11}{3}$

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

$9 + 1 = c^2$

$10 = c^2$

$\pm\sqrt{10} = c$

C: $(-2, 3)$ V: $(-2, 0)$ $(-2, 6)$

CV: $(-3, 3)$ $(-1, 3)$

F: $(-2, 3 \pm \sqrt{10})$

Asym: $y = 3x + 9$

$y = -3x - 3$

③ $\frac{(y-2)^2}{5} - \frac{(x-2)^2}{3} = 1$

$5 + 3 = c^2$

$8 = c^2$

$+\sqrt{8} = c$

$\pm 2\sqrt{2} = c$

C: $(2, 2)$ V: $(2, 2 \pm \sqrt{5})$

CV: $(2 \pm \sqrt{3}, 2)$

F: $(2, 2 \pm 2\sqrt{2})$

Asym: $y - 2 = \pm\frac{\sqrt{15}}{5}(x - 2)$

or $y = \pm\frac{\sqrt{15}}{5}(x - 2) + 2$