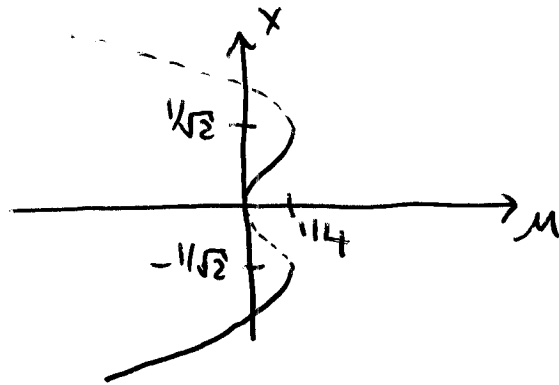


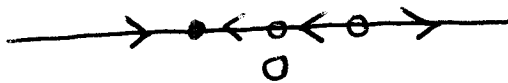
1 a)



$\mu < 0$

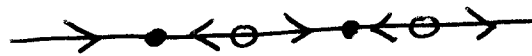


$\mu = 0$



saddle-node  
at  $(x, \mu) = (0, 0)$

$0 < \mu < \frac{1}{4}$



$\mu = \frac{1}{4}$

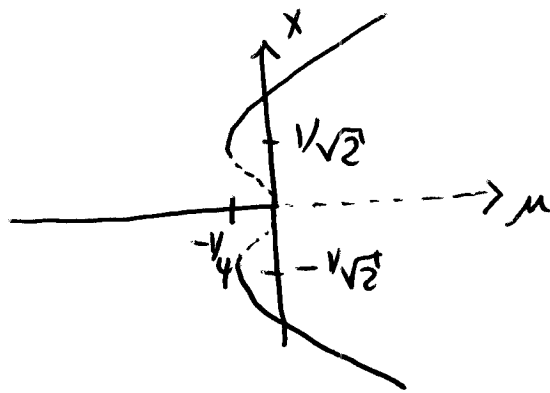


saddle nodes  
at  $(x, \mu) = (\pm \frac{1}{\sqrt{2}}, \frac{1}{4})$

$\mu > \frac{1}{4}$



1 b)



$$\mu < -\frac{1}{4}$$



$$\mu = -\frac{1}{4}$$



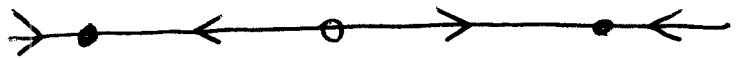
$$-\frac{1}{4} < \mu < 0$$



$$\mu = 0$$



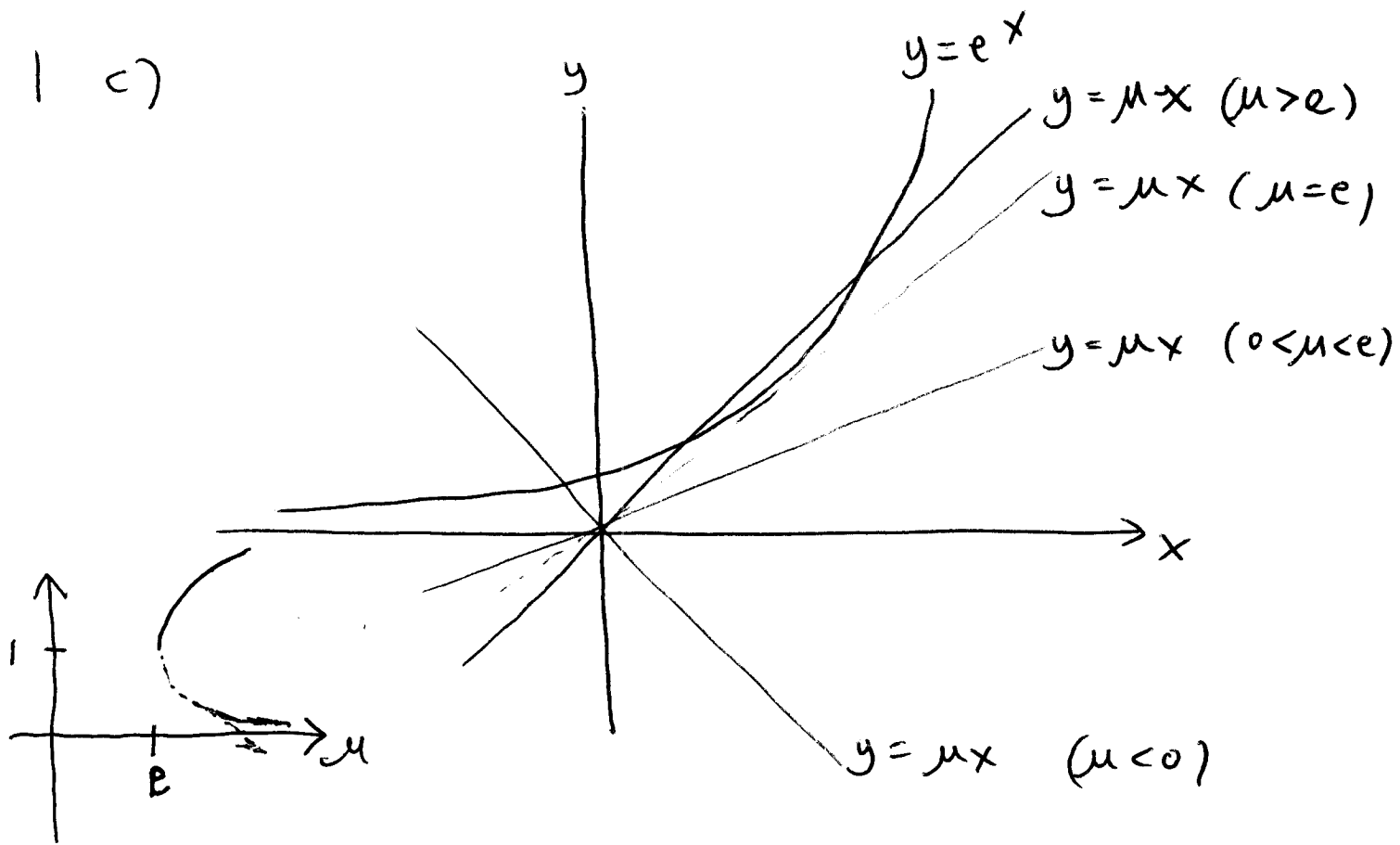
$$\mu > 0$$



subcritical pitchfork at  $(x, \mu) = 0$

Supercritical saddle-nodes at  $(x, \mu) = \left(\pm \frac{1}{\sqrt{2}}, -\frac{1}{4}\right)$

1 c)



$\mu < 0$



$\mu = 0$



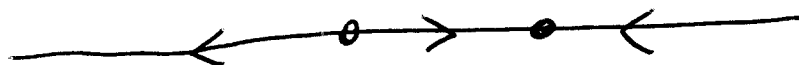
$0 < \mu < e$



$\mu = e$

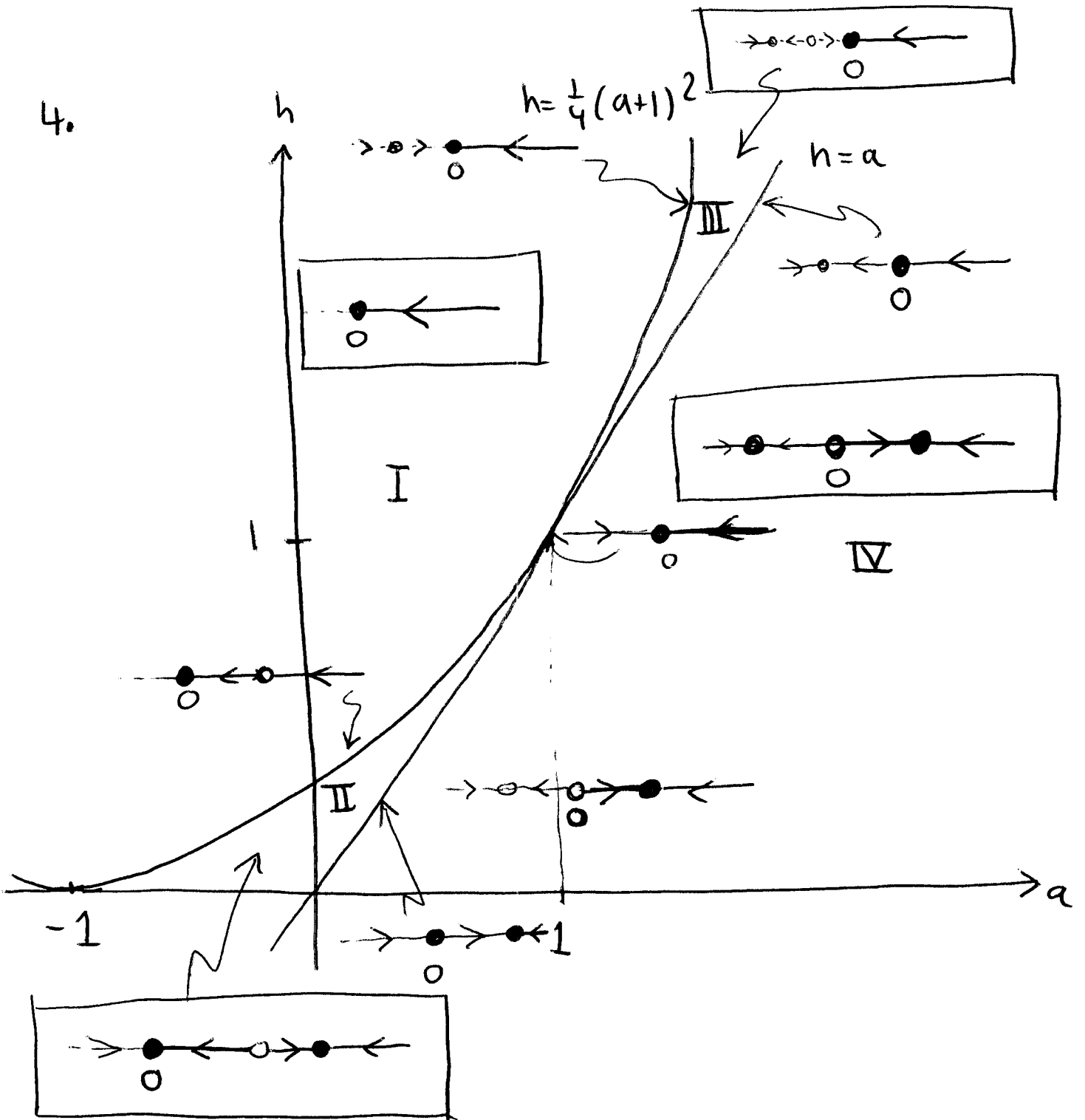


$e < \mu$



Supercritical saddle-node at  $(x, \mu) = (1, e)$

4.



Saddle-node on  $h = \frac{1}{4}(a+1)^2$

Transcritical on  $h = a$

Pitchfork at  $(x, h, a) = (0, 1, 1)$