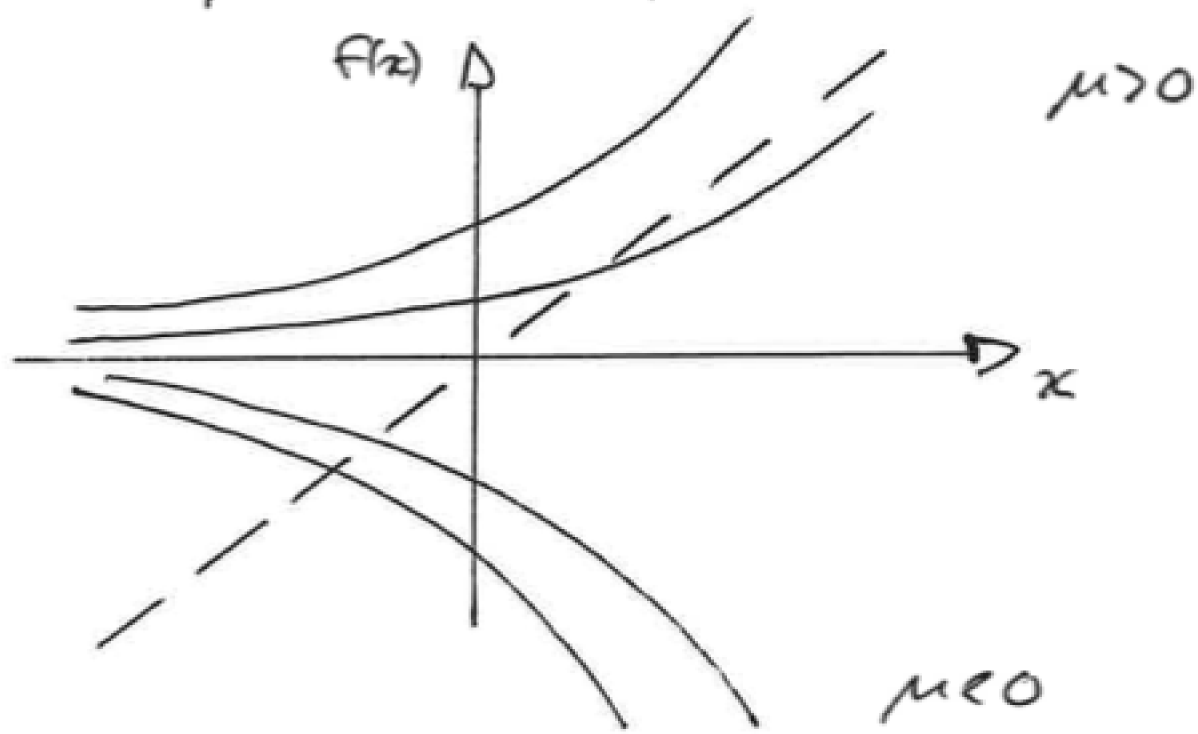
1.

$$x_{n+1} = \mu e^{x_n} =: f(x_n, \mu)$$



Possibility of saddle-node bifurcation if $\mu > 0$, period doubling if $\mu < 0$.

a) Saddle-node bifurcation occurs when $x = f(x, \mu)$ and $f_x(x, \mu) = 1$.

So $\quad x = \mu e^x$ and $\mu e^x = 1$

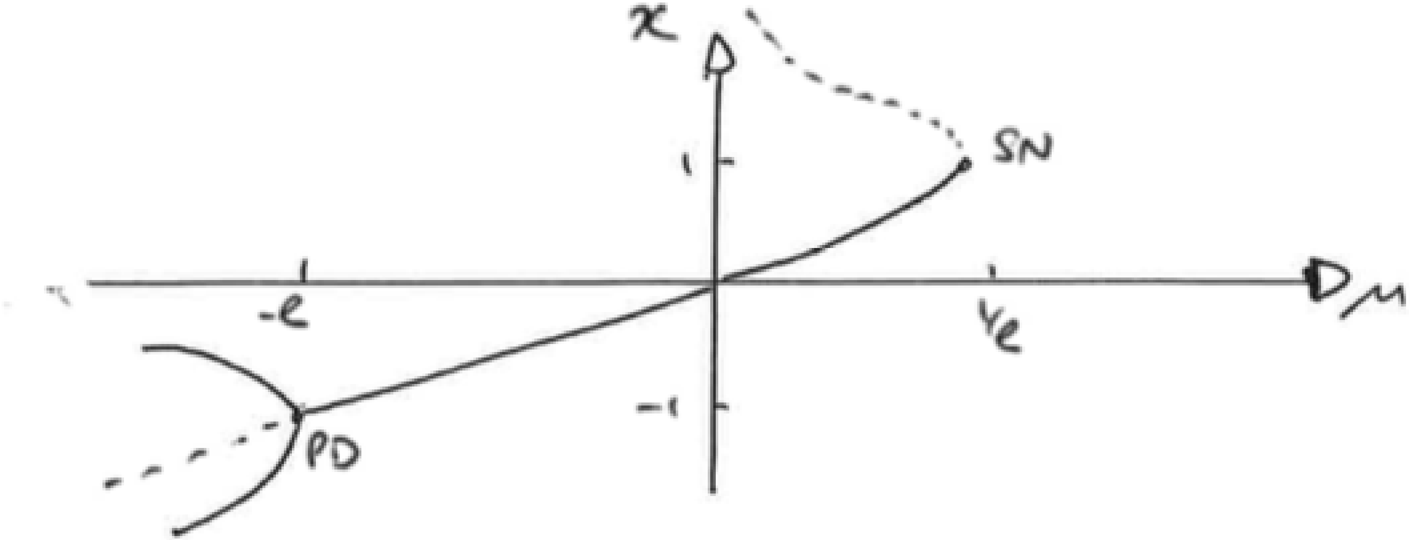
$\Rightarrow \quad x = 1$ and $\mu = \frac{1}{e}$.

b) Period-doubling bifurcation occurs when $x = f(x, \mu)$ and $f_x(x, \mu) = -1$.

So $\quad x = \mu e^x$ and $\mu e^x = -1$

$\Rightarrow \quad x = -1$ and $\mu = -e$.

Looking at the sketch of $f(x, \mu)$ to infer stability, the bifurcation diagram is


x
1
SN
-e
1/e
μ
-1
PD