```
ClearAll["Global`*"];
Remove["Global`*"];

f[x_, h_, r_] := h + x * (r - x);
fPrime = D[f[x, h, r], x]

(*Solutions, the positive one is unstable, the negative one is stable"*)
(*For h < h_c(r) we dont have any real roots,
and thus no fixed points in this case*)
fixedPoints = Solve[f[x, h, r] == 0, x]
stability = fPrime /. x → x /. fixedPoints

(*Bifurcation curve *)
xSolution = Solve[fPrime == 0, x]
hSolution[r_] = Solve[f[x /. xSolution, h, r] == 0, h]

Plot[
 {h /. hSolution[r]}, {r, -2, 2},
 PlotRange → {{-2, 2}, {-1, 1}},
 Filling → {1 → {1, LightBlue}},
 AxesLabel → {"r", "h"},
 PlotStyle → {Blue, Thick},
 LabelStyle → {FontSize → 14},
 Epilog → {Text["2 FP, 1 stable, 1 unstable", {-0.5, 0.5}, {1, 0}],
   Text["No fixed points", {-0.5, -0.7}, {1, 0}]},
 PlotLegends → {"h_c(r)"}
]
```

Out[•]=

$$r - 2\,x$$

Out[•]=

$$\left\{\left\{x \to \frac{1}{2}\left(r - \sqrt{4\,h + r^2}\right)\right\}, \left\{x \to \frac{1}{2}\left(r + \sqrt{4\,h + r^2}\right)\right\}\right\}$$

Out[•]=

$$\left\{\sqrt{4\,h + r^2}\,,\ -\sqrt{4\,h + r^2}\right\}$$

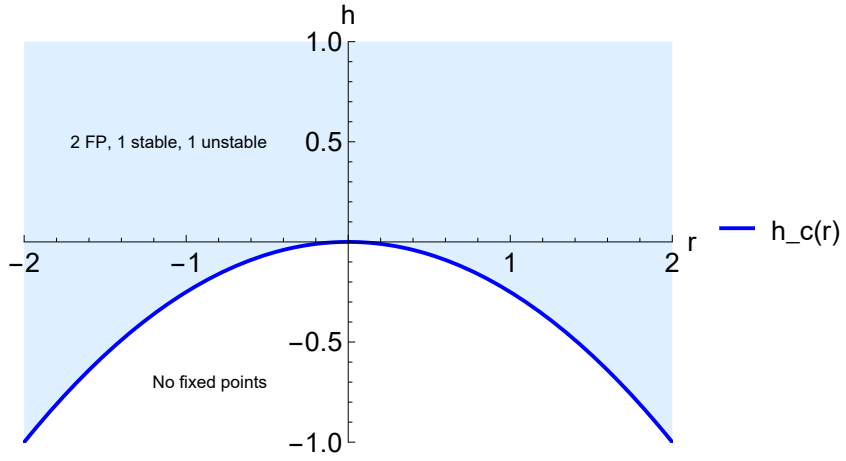
Out[•]=

$$\left\{\left\{x \to \frac{r}{2}\right\}\right\}$$

Out[•]=

$$\left\{\left\{h \to -\frac{r^2}{4}\right\}\right\}$$

Out[•]=



Out[•]=

$$\left\{\left\{x \to \frac{1}{2}\left(r - \sqrt{4h + r^2}\right)\right\}, \left\{x \to \frac{1}{2}\left(r + \sqrt{4h + r^2}\right)\right\}\right\}$$

In[•]:=
```
ClearAll["Global`*"];
Remove["Global`*"];
f[x_, h_, r_] := h + x * (r - x)

fixedPoints = Solve[f[x, h, r] == 0, x]

fixedPointPos = x /. fixedPoints[[1]]; (*Unstable*)
fixedPointNeg = x /. fixedPoints[[2]]; (*Stable*)

Plot3D[
 Evaluate[{fixedPointPos, fixedPointNeg}], {r, -2, 2}, {h, -1, 1},
 PlotRange → All,
 AxesLabel → {"r", "h", "x*"},
 PlotLabel → "Fixed Points in (r, h, x*)"]
```

Out[•]=
$$\left\{\left\{x \to \frac{1}{2}\left(r - \sqrt{4h + r^2}\right)\right\}, \left\{x \to \frac{1}{2}\left(r + \sqrt{4h + r^2}\right)\right\}\right\}$$

Out[•]=