Intro to Logistic Differential Equations
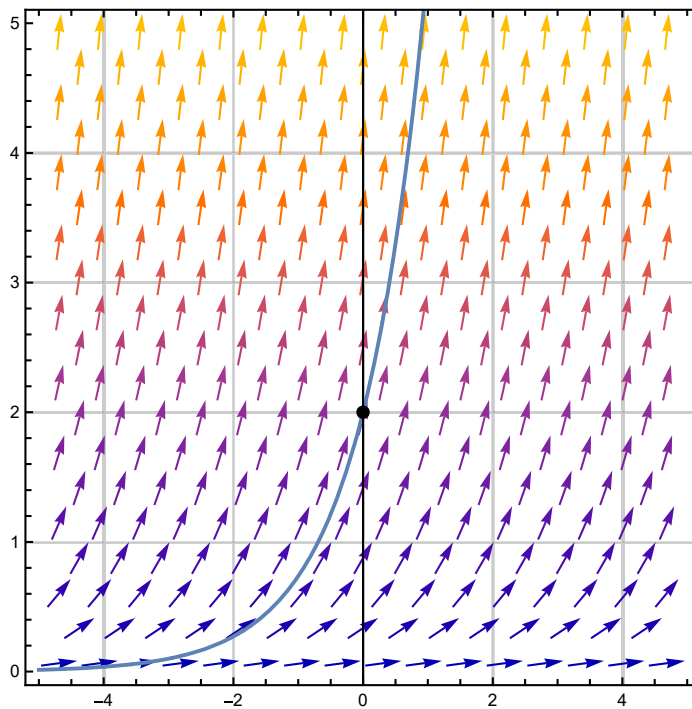
The slope field for e^x

In[ ]:= `VP = VectorPlot[{1, y}, {x, -5, 5}, {y, 0, 5}, Axes → True, GridLines → Automatic];`

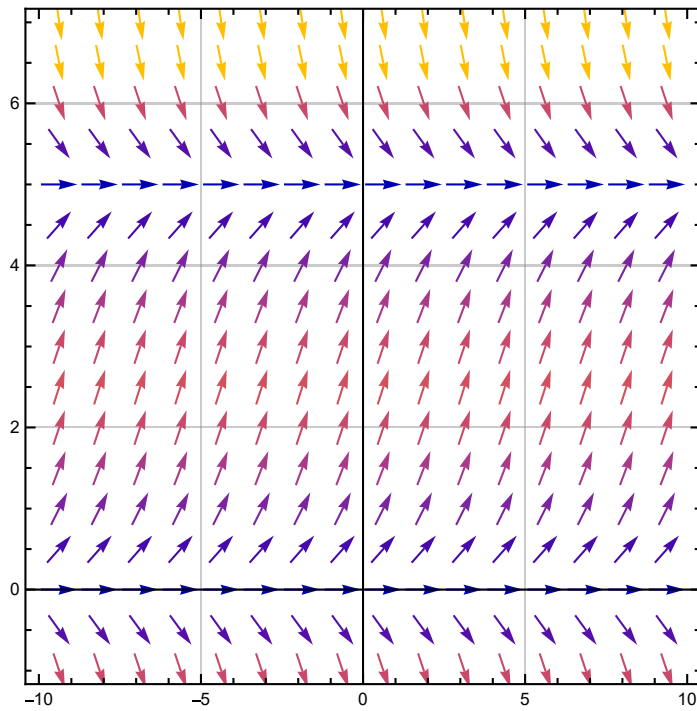*In[ ]:=* `PS = Plot[2 Exp[x], {x, -5, 5}];`

In[ ]:= `Show[VP, PS, Graphics[{PointSize[Large], Point[{0, 2}]}]]`

Out[ ]=

In[ ]:= **SV = VectorPlot[{1, 0.2 y (5 - y)}, {x, -10, 10}, {y, -1, 7},**
    VectorPoints → "Regular", Axes → True, GridLines → Automatic]
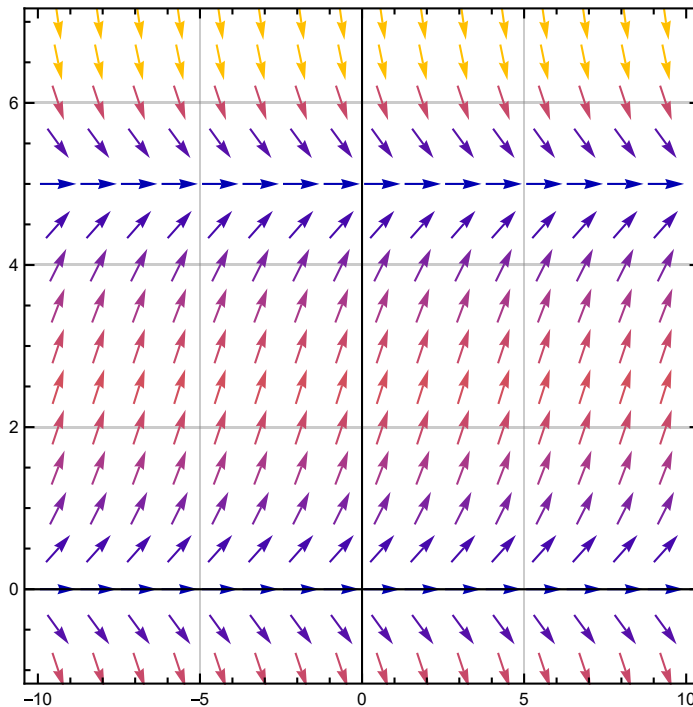
Out[ ]=

Logistics Graph 1

In[•]:= `SV = VectorPlot[{1, 0.2 y (5 - y)}, {x, -10, 10}, {y, -1, 7},`
`    VectorPoints → "Regular", Axes → True, GridLines → Automatic]`

Out[•]=

In[•]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 2}, y[t], t]〚1〛;`
`SS = Plot[sol, {t, -5, 5}];`

⋯ Solve: Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ⓘ

In[•]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 4}, y[t], t]〚1〛;`
`SSS = Plot[sol, {t, -5, 5}];`

⋯ Solve: Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution information. ⓘ
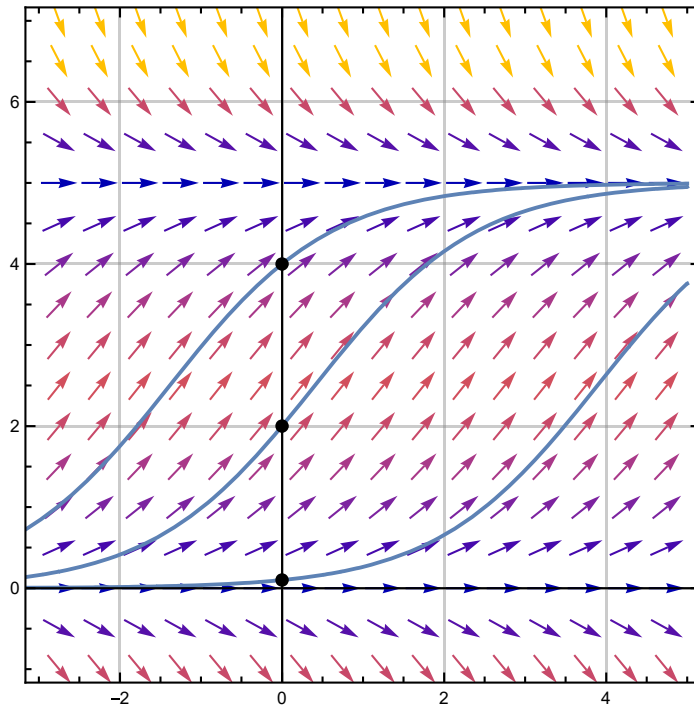
In[•]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 0.1}, y[t], t]〚1〛;`
`SolP = Plot[sol, {t, -5, 5}];`

In[ ]:= **Show[SV, SS, SolP, SSS, Graphics[{PointSize[Large], Point[{0, 2}]}],**
Graphics[{PointSize[Large], Point[{0, 4}]}],
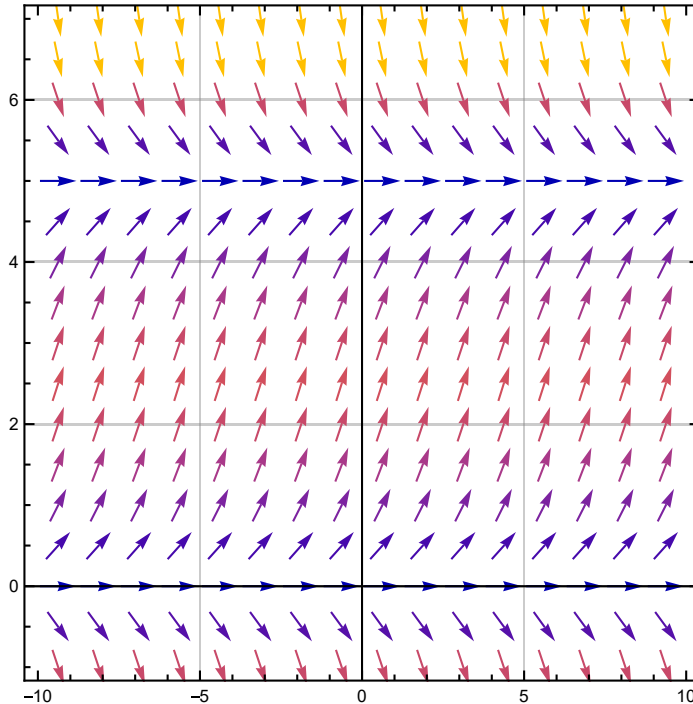**Graphics[{PointSize[Large], Point[{0, 0.1}]}]]**

Out[ ]=

Logistics Graph 2

In[ ]:= `SV = VectorPlot[{1, 0.2 y (5 - y)}, {x, -10, 10}, {y, -1, 7},`
`    VectorPoints → "Regular", Axes → True, GridLines → Automatic]`

Out[ ]=

In[ ]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 2}, y[t], t]〚1〛;`
`SS = Plot[sol, {t, -10, 10}];`

⋯ Solve: Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution
information. ⓘ

In[ ]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 4}, y[t], t]〚1〛;`
`SSS = Plot[sol, {t, -10, 10}];`

⋯ Solve: Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution
information. ⓘ

In[ ]:= `ClearAll[y]`
`sol = y[t] /. DSolve[{y'[t] == 0.2 y[t] (5 - y[t]), y[0] == 0.1}, y[t], t]〚1〛;`
`SolP = Plot[sol, {t, -10, 10}]`

⋯ Solve: Inverse functions are being used by Solve, so some solutions may not be found; use Reduce for complete solution
information. ⓘ

In[ ]:= `SL = Plot[2.5, {x, -10, 10}, PlotStyle → {Thick, Green}];`

In[ ]:= **Show[SV, SS, SolP, SSS, SL, Graphics[{PointSize[Large], Point[{0, 2}]}],**
Graphics[{PointSize[Large], Point[{0, 4}]}],
Graphics[{PointSize[Large], Point[{0, 0.1}]}]]

Out[ ]=