Modeling Yeast Growth

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Notebook to support Exercise 2.2.8, modeling yeast population growth.

```
> restart;
  with(plots) :
```

The data, in time/population pairs.

```
> data := [[0, 9.6], [1, 18.3], [2, 29], [3, 47.2], [4, 71.1], [5, 119.1], [6, 174.6], [7, 257.3], [8,
      350.7], [9, 441], [10, 513.3], [11, 559.7], [12, 594.8], [13, 629.4], [14, 640.8], [15,
      651.1], [16, 655.9], [17, 659.6]] :
```

A plot

```
> plt1 := pointplot(data, color = red, symbol = solidcircle, symbolsize = 20, labels
       = ["time (hours)", "Population (millions)"]) :
  pp := display(plt1);
```

Given that u(0) = 9.6, the solution to the logistic equation with intrinsic growth rate "r" and carrying capacity "K" is

```
> u(t) := K / (1 + exp(-r·t)·(K/9.6 - 1))
```

Take a guess r = 1 and K = 600, plot, compare to the data

```
> plt2 := plot(subs(r = 1, K = 600, u(t)), t = 0..17, color = blue, thickness = 3, labels = ["t",
      "Population"]) :
  display(plt1, plt2)
```

Perhaps we can do better...

```
>
```