

GROWTH & SIGMOIDS



Saccharomyces uvarum & *S. cerevisiae*

LOGISTIC EQUATION

differential equation (continuous)
 $[d / dt] N(t) = r N(t) (K - N(t))$

solution
 $N(t) = K / (1 + \text{Exp}[r (C_{K/2} - t)])$

carrying capacity K
yogurt: if unlimited, then oodles after
one day (Earth size after 4 days)!

$C_{K/2}$

$$N(t) = K / (1 + \text{Exp}[r (C_{K/2} - t)])$$

$$N(t) = K / 2$$

$$(1 + \text{Exp}[r (C_{K/2} - t)]) = 2$$

$$\text{Exp}[r (C_{K/2} - t)] = 1$$

$$C_{K/2} = t \text{ at which } N(t) \text{ is } K / 2$$

LINEAR TRANSFORMATION

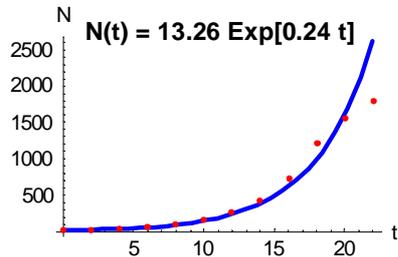
$$N(t) = K / (1 + \text{Exp}[r (C_{K/2} - t)])$$

$$(K / N(t)) - 1 = \text{Exp}[r (C_{K/2} - t)]$$

$$\text{Log}_e[(K / N(t)) - 1] = r C_{K/2} - r t$$

- {0, 12}
- {2, 20}
- {4, 33}
- {6, 56}
- {8, 93}
- {10, 155}
- {12, 258}
- {14, 431}
- {16, 720}
- {18, 1203}
- {20, 1556}
- {22, 1804}

Age t [hours] and Individual Number N for *Drosophila* culture over the first day



- {14, 431}
- {16, 720}
- {18, 1203}
- {20, 1556}
- {22, 1804}
- {24, 1957}
- {26, 2056}
- {28, 2104}
- {30, 2115}
- {32, 2123}
- {34, 2131}
- {36, 2133}
- {38, 2133}

Age t [hours] and Individual Number N for *Drosophila* culture until K was achieved

$$N(t) = 2133 / (1 + \text{Exp}[0.31(17.52 - t)])$$

