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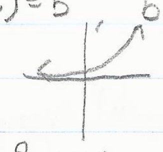
Chapter 3 Summary

$f(x)=b^x$, $b>1$, asymptote: $y=0$



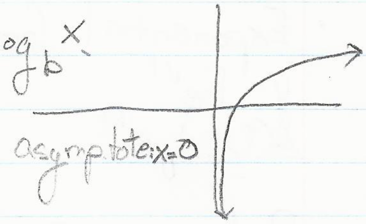
$D=(-\infty,\infty)$

$R=(0,\infty)$

$f^{-1}(x)=\log_b x$

$D=(0,\infty)$

$R=(-\infty,\infty)$ asymptote: $x=0$



$e=2.718\ldots$

$f(x)=(1+\frac{1}{x})^x$ approaches e as $x\to\infty$.

- Compound interest

$A=P(1+\frac{r}{n})^{nt}$

A= amount

P= principal

r= rate

t= time in years

n= compounds per year

- Continuously compounded interest

$A=P(1+\frac{r}{xr})^{xrt}$

$=P(1+\frac{1}{x})^{xrt}$

$=P[(1+\frac{1}{x})^x]^{rt}$

$=Pe^{rt}$

Determine domain first before solving anything!

$f(x)=a^x \quad f^{-1}(x)=\log_a x$

$\log_b 1=0$

$\log_b b=1$

$\log_b b^x=x$

$b^{\log_b x}=x$

$\log_e x=\ln x$ (natural log)

change of base

$\log_a x=\frac{\log x}{\log a}=\frac{\ln x}{\ln a}=\frac{\log_b x}{\log_b a}$

$\log_a(uv)=\log_a u+\log_a v$

$\log_a(u/v)=\log_a u-\log_a v$

$\ln(uv)=\ln u+\ln v$

$\ln(u/v)=\ln u-\ln v$

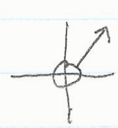
$\log_a b^c=c\log_a b$

$\ln a^b=b\ln a$

$a\log_b c=\log_b c^a$

$a\ln b=\ln b^a$

$f(x)=e^{\ln x}$, $D:(0,\infty)$



one-to-one property

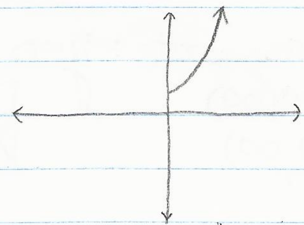
$\square^{2x-3}=\square^{x+4}\to\log_\square$ of both sides $\to 2x-3=x+4$

$\log_\square(x^2-3)=\log_\square(5x)\to x^2-3=5x$

- Exponential Growth

  $y = Be^{Kt}$

  $A(t) = A_0 e^{Kt}$ $\quad K>0$



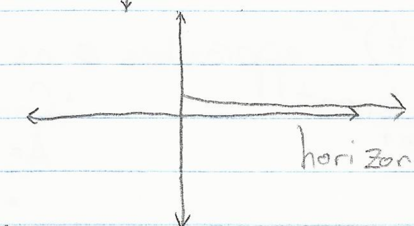
$t \geq 0$

horizontal asymptote: $y=0$

- Radioactive Decay

  $y = Be^{Kt}$

  $A(t) = A_0 e^{Kt}$ $\quad K<0$

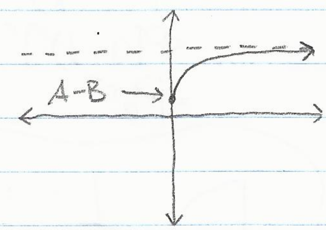


$t \geq 0$

horizontal asymptote:

- Learning curve

  $y = A - Be^{-Kt}$



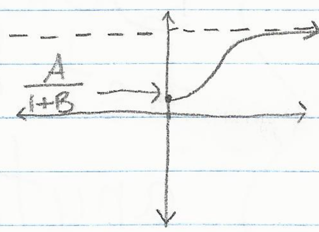
horizontal asymptote: $y=A$

$t \geq 0$

- Logistical growth

  $y = \dfrac{A}{1+Be^{-AKt}}$

  $y = \dfrac{P}{1+ae^{-Kt}}$



horizontal asymptote: $y=A$

- $f(x) = \log x$