Precalculus - Unit 4 Power Point Key

Slide 2: a) $\boxed{2}$ b) $\boxed{-3}$ c) $\boxed{\frac{1}{2}}$ d) $\boxed{0}$ e) $\boxed{x+2}$ f) $\boxed{3x}$

$\log_3 27^x$
$= \log_3 (3^3)^x$
$= \log_3 3^{3x}$
$= 3x$

Slide 3: a) $\boxed{\log_b 7 + 2\log_b x}$

b) $\boxed{\log_5 3 + \log_3 x - \log_3 y}$

c) $\log_8 8 + \log_8 x^3 + \log_8 y - \log_8 z$

$\boxed{1 + 3\log_8 x - \log_8 y - \log_8 z}$

d) $\boxed{\log_4 (x-2) - \log_4 (x+1)}$

Slide 4: a) ~~~~~~~~ $\log_4 ((x+3)(x-1)) = \boxed{\log_4 (x^2+2x-3)}$

b) $\boxed{\log_3 \left(\frac{x^2 y^4}{w^3}\right)}$

Slide 5: a) $\frac{\log 12}{\log 5} = \boxed{1.54}$ b) $\boxed{1.95}$

Slide 6: a) $5^{3x} = 5^3$

$3x = 3$

$\boxed{x = 1}$

b) $\ln e^{2x+1} = 17$

$2x+1 = 17$

$2x = 16$

$\boxed{x = 8}$

c) $\frac{15}{12} = e^{-.05x}$

$\ln \frac{5}{4} = \ln e^{-.05x}$

$\ln \frac{5}{4} = -.05x$

$\boxed{x = \frac{\ln 5/4}{-.05}}$

$\boxed{x = -4.46}$

d) $1 + 3e^{.025x} = \frac{500}{200}$

$3e^{.025x} = \frac{3}{2}$

$e^{.025x} = \frac{1}{2}$

$\ln e^{.025x} = \ln 1/2$

$.025x = \ln(1/2)$

$\boxed{x = \frac{\ln(1/2)}{.025} = -27.73}$

Slide 7: a) $3x+2 = 7x$

$2 = 4x$

$\boxed{x = 1/2}$

b) $\log_4(x+3) + \log_4(2-x) = 1$

$\log_4((x+3)(2-x)) = 1$

$4^{\log_4(-x^2-x+6)} = 4^1$

$-x^2-x+6 = 4$

$x^2+x-2 = 0$

$(x+2)(x-1) = 0$

$\boxed{x=-2}$ $\boxed{x=1}$

Slide 8: $A = Pe^{rt}$

$20 = 10e^{.045t}$

$2 = e^{.045t}$

$\ln 2 = \ln e^{.045t}$

$\ln 2 = .045t$

$t = \frac{\ln(2)}{.045} = \boxed{15.4 \text{ yrs.}}$

Slide 9: $A = 10e^{Kt}$ $(5730, 5)$

$5 = 10e^{K(5730)}$

$\frac{1}{2} = e^{K(5730)}$

$\ln 1/2 = 5730K$

$K = \frac{\ln(1/2)}{5730} \approx -.00012$

$A = 10e^{-.00012t}$ 20% of 10 = 2

$2 = 10e^{-.00012t}$

$1/5 = e^{-.00012t}$

$\ln 1/5 = -.00012t$

$t = \frac{\ln(1/5)}{-.00012} = \boxed{13,304.65 \text{ years}}$

Slide 10: a) $900 = \frac{1000}{1+9e^{-.6t}}$

$1+9e^{-.6t} = \frac{1000}{900}$

$9e^{-.6t} = 1/9$

$e^{-.6t} = 1/81$

$\ln e^{-.6t} = \ln 1/81$

$-.6t = \ln 1/81$

$t = \frac{\ln 1/81}{-.6} = \boxed{7.32 \text{ years}}$

b) $\boxed{1000}$ → carrying capacity

c) $P(0) = \frac{1000}{1+9e^{-.6(0)}} = \boxed{100 \text{ fish}}$

Slide 12: $e^{i\pi} = \boxed{-1}$

Slide 11: $A = 13e^{Kt}$ $(12, 4.75)$

$4.75 = 13e^{K(12)}$

$\frac{4.75}{13} = e^{12K}$

$\ln \frac{4.75}{13} = \ln e^{12K}$

$\ln \frac{4.75}{13} = 12K$

$K = \frac{\ln(\frac{4.75}{13})}{12} = -.0839$

$\boxed{A = 13e^{-.0839t}}$

~~$A = 13e^{-.0839t}$~~

Slide 13: From Desmos

$\boxed{A = 3.80731e^{.266733t}}$

exponential growth

Slide 14: $f(x) = 3^{(x-2)} + 3$

↑ right 2

↑ up 3