Logarithms and Decibels (24:44)

Solve for the following expressions:

10^2 =
10^5 =
2^3 =
e^2 =

Solve for the following expressions:

$\log_{10}(100)$ =
$\log_{10}(100{,}000)$ =
$\log_2(8)$ =
$\log_e(7.39)$ =

Identify a shorthand means of identifying the common and natural log.

Identify how to perform the common log on the Texas Instruments TI-89 Titanium Edition Scientific Graphing Calculator.

Perform the following operations on the scientific calculator.

log(40) =
log(90)
log(1200)
log(8)
log(1)
log(.1)
log(0)
log(any negative number)

Draw a plot of the common log and identify important properties.

Use the properties of logarithms to simplify these epressions:

log(a)*log(b)
log(a)*log(b)
$\log(a^n)$

Evaluate the following expressions using properties of logarithms:

log(12*50) =
log(2400/30) =
$\log(16^4)$ =

Identify reasons why logarithms are employed in electrical circuit analysis.

Describe semi-log plots. Draw a semi-log plot.

Identify percentages which correspond to points of interest on the logarithmic scale.

Identify the value of a point 60% of the way between 1000Hz and 10,000Hz.

Identify the value of a point 85% of the way between 100Hz and 1,000Hz.

Identify where 200kHz appears on a logarithmically plotted scale.

Define gain.

Describe an active system. Given an example of an active system. Identify how an active system produces greater output than input.

Describe a passive system. Given an example of a passive system.

Describe the behavior of a low pass filter.

Describe the behavior of a high pass filter.

Identify what unit is used to quantify gain.

Convert Bels to decibels.

Identify how gain in units of dB is calculated in terms of power.

Identify how gain in units of dB is calculated in terms of power.

Calculate the gain in units of dB for a system that takes 5V input and amplifies it to 12V.

Calculate the gain in units of dB for a system that takes 5mV input and amplifies it to 12V.

Calculate the gain in units of dB for a filter operating inside the pass band such that 12V input is reduced to 11.1V output.

Calculate the gain in units of dB for a filter operating inside the pass band such that 12V input is reduced to 3.8V output.

Predict the sign of gain for active systems experiencing output voltage greater than input voltage.

Predict the gain of a passive filter operating inside the pass band. Indicate the significance of this prediction.

Predict the gain of a passive filter operating inside the pass band. Indicate the significance of this prediction.

Calculate the gain of a system with 12V input and 12V output.

Identify the gain of a system operating at half maximum power. Identify output voltage for a system operating at half maximum power.

Identify the voltage and power characteristics of a system operating at a gain of -20dB.

Calculate the gain in units of dB for a filter operating at the critical frequency such that 12V input is reduced to 8.5V output. Identify the ratio of output voltage over input voltage at the critical frequency.

Calculate the gain in units of dB for a filter operating deep in the stop band such that 12V input is reduced to 1.2V output.