1. $m^{2.3} = 25$ solve for $m$

$Log(m^{2.3} = 25)$

$2.3\ Log m = Log 25$

$Log m = .6078$ $Log N = X$ $10^X = N$

$10^{.6078} = m$

$\boxed{m = 4.053218}$ ☆

$4.053218^{2.3} = 25$ ☆

2. $X = Log_3 2187$

7 ti:89 = log(2187, 3) = 7

$X = Log_3 2187$ $Log N = X$ $10^X = N$

$3^X = 2187$

$Log(3^X = 2187)$

$X(Log 3) = (Log 2187)$

$X = \frac{Log 2187}{Log 3}$

$\boxed{X = 7}$

3. $L_1 = ((L_2)^2)^{\frac{1}{3}}$ Solve for $L_2$

$(L_1 = ((L_2)^2)^{\frac{1}{3}})^3$

$L_1^3 = L_2^2$

$\sqrt{L_1^3} = \sqrt{L_2^2}$

$\boxed{L_2 = \sqrt{L_1^3}}$

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4. $I = \left(\frac{V}{L}\right) t e^{sct}$ Solve sc

$I = \frac{Vt}{L} e^{sct}$

$\frac{IL}{Vt} = e^{sct}$

$\overset{x}{e^{sct}} = \overset{N}{\frac{IL}{Vt}}$ $LN\,N = x \quad e^x = n$

$\frac{LN \frac{IL}{Vt}}{t} = \frac{sct}{t}$

$$\boxed{SC = \frac{LN\left(\frac{IL}{Vt}\right)}{t}}$$

5. $I_K = AT^2 e^{-B/t}$ Solve for A

Solve for B

$$\boxed{A = \frac{I_K}{T^2 e^{-B/t}}}$$

$\overset{x}{e^{-B/t}} = \overset{N}{\frac{I_K}{AT^2}}$ $LN\,N = y \quad e^y = N$

$LN\left(\frac{I_K}{AT^2}\right) = \frac{-B}{t}$

$$\boxed{B = -t\left(LN\left(\frac{I_K}{AT^2}\right)\right)}$$

1. An amplifier is rated as having a 90 dB gain. What power ratio does this represent?

$$dB = 10 \log \frac{P_{out}}{P_{in}}$$

$$90 = 10 \log \frac{P_{out}}{P_{in}}$$

$$9 = \log \frac{P_{out}}{P_{in}} \qquad \log N = X \quad 10^X = N$$

$$\boxed{10^9 = \frac{P_{out}}{P_{in}}}$$

2. An amplifier has a gain of 60dBm. If the input power is 1mw, What is the output power?

$$60\,dBm = 10 \log \frac{P_{out}}{1mW}$$

$$6 = \log \frac{P_{out}}{1mw} \qquad \log N = X \quad 10^X = N$$

$$10^6 = \frac{P_{out}}{1mW}$$

$$\boxed{P_{out} = 1\,KW}$$

3. The manufacturer of a high-fidelity 100W power amplifier claims that hum and noise in the amplifier is 90dB below full power output. How much hum and noise power does this represent?

$$-90 = 10 \log \frac{X}{100w}$$

$$-9 = \log \frac{X}{100} \qquad \log N = X \quad 10^X = N$$

$$10^{-9} = \frac{X}{100}$$

$$X = 100nW$$

$$\boxed{\text{Noise \& Hum} = 100nW}$$

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4. A network has a loss of 80dB. What power ratio corresponds to this loss?

$$-80dB = 10 \log \frac{P_{out}}{P_{in}}$$

$$-8 dB = \log \frac{P_{out}}{P_{in}} \qquad \log N = X \quad 10^X = N$$

$$\boxed{10^{-8} = \frac{P_{out}}{P_{in}}}$$

5. An amplifier has a input impedance of 600 Ω and a output impedance of 6000 Ω. The power out is 30 w. When 1.9 v is applied across the input

a. What is the voltage gain of the amplifier?

$$A_v = \frac{V_{out}}{V_{in}} = \frac{424.2641}{1.9v} \qquad 30w = \frac{V^2}{6000}$$

$$\boxed{A_v = 223.2969} \qquad V^2 = 180K$$

$$V = 424.2641$$

b. What is the power gain in dB?

$$dB = 10 \log \frac{P_{out}}{P_{in}} \qquad P_{out} = 30w$$

$$dB = 10 \log \frac{30}{6.0167mw} \qquad P_{in} = 6.0167mW \quad \frac{V^2}{R} = \frac{1.9^2}{600}$$

$$\boxed{36.97765 dB}$$

c. What is the input power?

$$P_{in} = \frac{V^2}{R} = \frac{1.9^2}{600}$$

$$\boxed{P_{in} = 6.01667mW}$$

6. The noise level of a telephone line used for wired music programs is 60dB down from the program level of 12.5mW. How much noise power is represented by this level?

$$dB = 10 \log \frac{P_{out}}{P_{in}}$$

$$-60 = 10 \log_N \frac{x}{12.5mW} \qquad \log N = X \quad 10^x = N$$

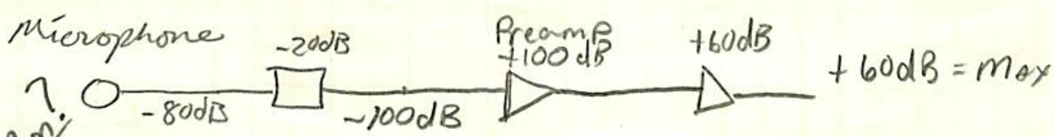
$$-6 = \log \frac{x}{12.5mW}$$

$$10^{-6} = \frac{x}{12.5mW}$$

$$\boxed{noise = 12.5nW}$$

7. A crystal microphone is rated microphone is rated at -80dB. There is onhand a final AF amplifier rated at 60dB. How much gain must be provided by a preamp in order to drive the final amplifier to full output if a attenuator pad between the microphone and the preamp has a loss of 20dB?

Bad Question Should Be change To dBm?




$\boxed{100dB}$

8. An Amplifier has a normal output of 30w. A selector switch is arranged to reduce the output in 5dB steps. What power output corresponds to reductions of 5, 10, 15, 20, 25, & 30dB?

$$-5dB = 10 \log \frac{x}{30w} \qquad \log n = X \quad 10^x = N$$

-5dB = 9.487 watts
-10dB = 3 watts
-15dB = .9486 watts
-20dB = .3 watts
-25dB = .09486 watts
-30dB = .03 watts

9.) A two-stage video RF amp has a 300 $\mu$V input signal into 75 $\Omega$. The second stage has a gain of 50dB. When matched input-output impedances are used, the voltage output of the second stage must be 4.22V to allow distribution of the signal. Determine:

a. The input voltage of the second stage.

$$50\text{dB} = 20 \log \frac{4.22\text{V}}{x} \qquad \log n = x \quad 10^x = n$$

$$\log \frac{4.22}{x} = 2.5$$

$$10^{2.5} = \frac{4.22}{x}$$

$$x = \frac{4.22}{10^{2.5}}$$

$$\boxed{V_{in}\ \text{second stage} = 13.345\text{mV}}$$

b. The dB gain of the first stage.

$$\text{dB} = 20 \log \frac{13.345\text{mV}}{300\mu\text{V}}$$

$$= \boxed{32.964\text{dB}}$$

c. The overall gain of the two amplifiers when all impedances are 75 ohms.

$$50\text{dB} + 32.964\text{dB} = \boxed{82.964\text{dB}}$$

10. A video tuner amplifier has an input impedance of 300 ohms and an output impedance of 3500 ohms. When a 300 mV signal is applied at the input, a 250 v signal appears at the output.

a. What is the Power output of the amplifier?

$$P_{out} = \frac{V^2}{R} = \frac{250^2}{3500}$$

$$\boxed{P_{out} = 17.857 \text{ watts}}$$

b. What is the power gain in dB?

$$10 \log \frac{P_{out}}{P_{in}} \qquad P_{in} = \frac{V^2}{R} = \frac{300mV^2}{300}$$

$$10 \log \frac{17.857W}{300\mu W} \qquad P_{in} = 300\mu W$$

$$\boxed{\text{gain} = 47.75 dB}$$

c. What is the voltage gain of the amplifier?

$$A_V = \frac{V_{out}}{V_{in}}$$

$$A_V = \frac{250V}{300mV}$$

$$\boxed{A_V = 833.333}$$

11. Given the following specifications for a 2N45 transistor What is the power input?

Collector voltage = -20V
Emitter current = 5mA
input impedance = 10Ω
source impedance = 50Ω
load impedance = 4500Ω
Power output = 45mW
Power gain = 23dB

$$dB = 10\log\frac{P_{out}}{P_{in}}$$

$$23dB = 10\log\frac{45mW}{P_{in}}$$

$$\overset{x}{2.3} = \log\frac{\overset{N}{45mW}}{P_{in}} \qquad \log N = x \quad 10^x = N$$

$$10^{2.3} = \frac{45mW}{P_{in}}$$

$$P_{in} = \frac{45mW}{10^{2.3}}$$

$$\boxed{P_{in} = 225.5343\mu W}$$

12. The input power to a 50Km line is 10mW. The output of this line is 40μW. What is the attenuation of this line per kilometer?

$$\frac{40\mu W}{10mW} = 50Km = 4mW = 80\mu W$$

$$\text{total } dB = 10\log\frac{40\mu W}{10mW}$$

$$\text{total } dB/_{50Km} = -23.9794 dB$$

$$\boxed{dB/_{1Km} = -.4796 dB/_{1Km}}$$

13. What is the dB gain necessary to produce a 60 μW signal in 600Ω telephone if the received signal supplies 9 μV to the 80Ω line that feeds the receiver?

$$= 10 \log \frac{P_{out}}{P_{in}}$$

$$= 10 \log \frac{60 \mu W}{1.0125 \times 10^{-12}} \qquad p_{in} = \frac{9 \mu V^2}{80}$$

$$\boxed{= 77.727 dB}$$

14. In problem 13 if the overall gain is increased to 96 dB what received signal will produce the 60 μW signal in the telephone?

$$96 dB = 10 \log \frac{60 \mu W}{P_{in}}$$

$$9.6 = \log \frac{60 \mu W}{P_{in}} \qquad \log N = x \quad 10^x = N$$

$$10^{9.6} = \frac{60 \mu W}{P_{in}}$$

$$P_{in} = \frac{60 \mu W}{10^{9.6}}$$

$$P_{in} = 15.0713 \times 10^{-15} W$$

$$P = \frac{V^2}{R} =$$

$$V^2 = (15.0713 \times 10^{-15})(80Ω)$$

$$V = \sqrt{(15.0713 \times 10^{-15})(80)}$$

$$\boxed{V = 1.098 \mu V}$$

15. The voltage across a 600Ω telephone is adjusted to 1.73 volts. When an audio filter is installed in the circuit, the voltage drops to 1.44 volts what is the insertion loss of the filter?

$$x = 20 \log \frac{V_{out}}{V_{in}} \qquad = 20 \log \frac{1.44}{1.73}$$

$$\boxed{-1.594 dB}$$