

Week 7 Questions and Answer Key

- Day 1, Review
- Day 2, Test (Integrals Applied)
- Day 3, questions 1-5
- Day 4, questions 6-10
- Day 5, questions 11-15

1. Given the equation $m^{2.3} = 25$, solve for m .

$$m = 4.053$$

2. Given the equation $x = \log_3 2187$, solve for x .

$$x = 7$$

3. Given the equation $L_1 = ((L_2)^2)^{\frac{1}{3}}$, solve for L_2 .

$$L_2 = \sqrt{(L_1)^3}$$

4. Given the equation $I = (\frac{V}{L})te^{sc t}$, solve for sc .

$$sc = \frac{LN(\frac{IL}{VI})}{t}$$

5. Given the equation $I_K = AT^2 e^{\frac{-B}{t}}$, solve for A and B .

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

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

6. Given the equation $L_1 = ((L_2)^2)^{\frac{1}{3}}$, solve for L_2 .

$$L_2 = \sqrt{(L_1)^3}$$

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

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

8. An amplifier has a gain of $60dBm$. What is the output power?

$$P_{out} = 1KW$$

9. The manufacturer of a high fidelity $100w$ power amplifier claimed that hum and noise in the amplifier is $90dB$ below the full power output. How much hum and noise power does this represent?

$$\text{noise and hum} = 100nW$$

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

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

11. An amplifier has a input impedance of 600Ω and a output impedance of $6K\Omega$. The power out is $30W$ when $1.9v$ is applied across the input:

- (a) What is the voltage gain of the amplifier?

$$\Delta_V = 223.297$$

- (b) What is the power gain of the amplifier in dB ?

$$\Delta_P = 36.978dB$$

- (c) What is the input power?

$$P_{in} = 6.017mW$$

12. 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?

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

13. A crystal 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 $20dB$?

$$\text{preamp gain} = 100dB$$

14. 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 the reduction of 5, 10, 15, 20, 25, and $30dB$?

$$-5dB = 9.487W$$

$$-10dB = 3W$$

$$-15dB = 0.9487W$$

$$-20dB = 0.3W$$

$$-25dB = 0.09487W$$

$$-30dB = 0.03W$$

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

15. A two-stage video RF amp has a $300\mu V$ input signal into 75Ω . 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 the following:

- (a) the input voltage of the second stage.

$$V_{in_{second\ stage}} = 13.345mV$$

- (b) The dB gain of the first stage.

$$\Delta_{dB} = 32.964dB$$

- (c) The overall gain of the two amplifiers when all impedances are 75Ω .

$$\text{Total Gain}_{dB} = 82.964dB$$