

MAT 120

Quiz 4

Fall 2020

- Suppose a signal has amplitude $A_1 = 4$ and then this is changed to a new amplitude $A_2 = 0.125$. What is the decibel level of the amplitude ratio A_2/A_1 ?
 a) -12 b) $-8\sqrt{2}$ c) -18 d) $-6\sqrt{2}$ e) -30
 Correct Answer: -30
- A signal has amplitude A_1 , which is multiplied by some number x to give the new value A_2 , and if A_2 is multiplied by x , then the value of the amplitude is now $16A_1$. What is the decibel level of the multiplier x ?
 a) 6 b) 12 c) 18 d) 9 e) 30
 Correct Answer: 12
- If x is the frequency ratio for an equal-tempered minor sixth, then what amplitude ratio in decibels is represented by x ?
 a) 6 b) 3 c) 8 d) 4 e) 1.5
 Correct Answer: 4
- Suppose a harmonic tone has amplitude A , and fundamental frequency F , and that both A and F are increased by a factor x . If the new tone is an equal-tempered perfect fourth above the old tone, what is the decibel level increase represented by x ?
 a) 2 b) 4 c) 3.5 d) 2.5 e) 3
 Correct Answer: 2.5
- Here is a partial list of the permutations of length three taken from the symbols a, b, c, d : $abc, acb, abd, adb, acd, adc, bac, bca, bad, bda, bcd, bdc$. How many permutations are missing from this list?
 a) 9 b) 4 c) 6 d) 12 e) 18
 Correct Answer: 12
- Rewrite $\sin \frac{\pi}{4} \cos \frac{\pi}{6}$ as a sum of two sine functions.
 a) $\frac{1}{2} \sin \frac{5\pi}{12} + \frac{1}{2} \sin \frac{\pi}{12}$ b) $\frac{1}{2} \sin \frac{\pi}{12} + \frac{1}{2} \sin \frac{11\pi}{12}$ c) $\frac{1}{2} \sin \frac{5\pi}{3} + \frac{1}{2} \sin \frac{\pi}{2}$ d) $\frac{1}{2} \sin \frac{5\pi}{6} + \frac{1}{2} \sin \frac{\pi}{12}$
 e) $\frac{1}{2} \sin \frac{\pi}{6} + \frac{1}{2} \sin \frac{\pi}{3}$
 Correct Answer: $\frac{1}{2} \sin \frac{5\pi}{12} + \frac{1}{2} \sin \frac{\pi}{12}$
- Approximately how many beats per second would be generated by playing a note which is three just perfect fourths above $A220$ and another note which is a frequency ratio of $\frac{26}{11}$ above $A220$, if we are just listening to the fundamental frequencies?
 a) 0.5 b) 1.5 c) 1.0 d) 2.5 e) 2.0
 Correct Answer: 1.5
 Correct Answer:
- If a tone is generated by the function $\sin(1000 \cdot 2\pi t)$ and the envelope is generated by the function $\sin 6\pi t$, then we should hear amplitude oscillations at how many beats per second? (Hint: first sketch the graph and label the period, then see how many beats will occur per second by taking into account the positive and negative oscillations of the higher frequency graph.)
 a) 5 b) 6 c) 2 d) 4 e) 3
 Correct Answer: 6
- An interval of nine *commas* (of any type) is approximately an equal-tempered:
 a) quarter-tone b) semitone c) tri-tone d) whole tone e) minor third
 Correct Answer: whole tone
- In the Bach-Lehman temperament, how many of the perfect fifths are Just P5 (or as Lehman calls them *pure*)?
 a) 1 b) 2 c) 3 d) 4 e) 5
 Correct Answer: 3