**Applied Acoustics - 24/10/2022 In-class test - Lecturer: Angelo Farina**

Note: some input data are based on the 6 digits of Matricula number, assigned to the 6 letters A B C D E F.

If you do not have yet a matricula number use your date of birth: DDMMYY.

If for example the matricula is 123456, it means that A=1, B=2, C=3, etc. .

Furthermore CD=34 (NOT 3x4), DE =45, EF =56.



**Surname and Name**



**Matricula signature**

1. **Check the sentences you think are always TRUE**

*multiple answers allowed: for each answer, 1 point if correct, -1 point if wrong, 0 point if "not selected"*

* Air absorption is the dominant cause of sound level reduction with distance
* Geometrical divergence is the dominant cause of sound level reduction with distance
* the "excess attenuation" always reduces the SPL
* some atmospheric effects can increase the SPL
* A sound barrier provides sound attenuation only for receivers in the "shadow zone"
* A sound barrier provides sound attenuation also for receivers outside the "shadow zone", which can "see" the source

**2) What's the effect of the directivity of a sound source?**

*multiple answers allowed: for each answer, 1 point if correct, -1 point if wrong, 0 point if "not selected"*

* A directive sound source always produces an increase of the SPL compared with an omnidirectional source having the same power
* A directive sound source radiates sound only on a portion of the sphere
* A directive sound source boosts the level in some directions and reduces the level in other directions.
* Only spherical sources can be directive, cylindrical sources have no directivity
* A directive sound source can increase significantly the critical distance

**3) In a semi-reverberant sound field:**

*Only one answer allowed, 1 point if correct, -1 if wrong, 0 if no answer*

* The level does not change with the source-receiver distance
* The level decays by 6 dB / doubling distance
* The level decays by 3 dB / doubling distance
* The level decays initially by 6 dB / doubling distance, then the decay smooths down, and beyond a certain distance the level is constant
* The level decays initially by 6 dB / doubling distance, and then becomes constant beyond the critical distance
* At the critical distance the SPL is 6 dB above the reverberant field level.

**4) Inside a room the reverberant field has a level Lrev=60+D dB. Compute the SPL at a distance from the source equal to twice the critical distance.**

(write number and measurement unit)

 **5) The SPL is 88+F dB(A) at a distance of 10+E m from an omnidirectional point source, placed over a reflecting plane. Compute the power level Lw of the sound source.**

(write number and measurement unit)

 **6) The SPL is 88+F dB(A) inside a reverberant room, where T = 2+E/10 s and V = 300+D\*20 m3. Compute the power level Lw of the sound source.**

(write number and measurement unit)

 **7) Compute the SPL at the critical distance in the same room as the previous exercise.**

 (write number and measurement unit)

**8) Compute the critical distance in the room of the previous exercise, knowing that the directivity of the sound source is Q = 3+F/3**

(write number and measurement unit)