VIB2021 : 1DOF

Number of participants: 58

1

When describing a harmonic motion, the complex amplitude vector contains

Answer	%	Votes
the phase information only	6%	3 votes
the amplitude and the frequency information	23%	12 votes
✓ both the phase and amplitude information	69%	36 votes
the frequency information only	2%	1 vote

2

The natural frequency of a mass-spring system depends on

✓ the mass of the system	74%	39 votes
✓ the stiffness of the system	83%	44 votes
the force with which we excite the system	8%	4 votes
the location of the force applied to the system	4%	2 votes

3

The natural frequency of a mass-spring system increases when

the mass increases	19%	10 votes
✓ the stiffness increases	75%	39 votes
✓ the mass decreases	71%	37 votes
the stiffness decreases	17%	9 votes

4

When an undamped 1DOF system is moved from the equilibrium position and then released, it oscillates freely at a frequency

Lower than its natural frequency	25%	12 votes
✓ Equal to its natural frequency	65%	31 votes
Higher than its natural frequency	10%	5 votes

5

When excited with a harmonic force at a frequency below the natural frequency of an undamped 1DOF system, the motion of the mass is

180° out-of-phase with the excitation	27%	13 votes
90° out-of-phase with the excitation	6%	3 votes
30° out-of-phase with the excitation	4%	2 votes
✓ in-phase with the excitation	63%	31 votes

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When excited with a harmonic force at a frequency above the natural frequency of an undamped 1DOF system, the motion of the mass is

✓ 180° out-of-phase with the excitation	93%	43 votes
90° out-of-phase with the excitation	2%	1 vote
60° out-of-phase with the excitation	0%	0 votes
random	4%	2 votes

7

For an undamped 1DOF system, when excited with a harmonic force at a frequency corresponding to its natural frequency, the amplitude of the motion is

in phase with the excitation force	21%	10 votes
180° out-of-phase with the excitation force	4%	2 votes
✓ infinite	75%	36 votes

8

It is possible to break a wine glass with your voice by

exciting it at very high frequency	8%	4 votes
exciting it at low frequency	0%	0 votes
✓ exciting it at one of its natural frequencies	92%	48 votes

9

When damping increases in a 1DOF system, the amplitude of vibration when excited near its natural frequency

increases	10%	5 votes
✓ decreases	79%	38 votes
remains constant	10%	5 votes

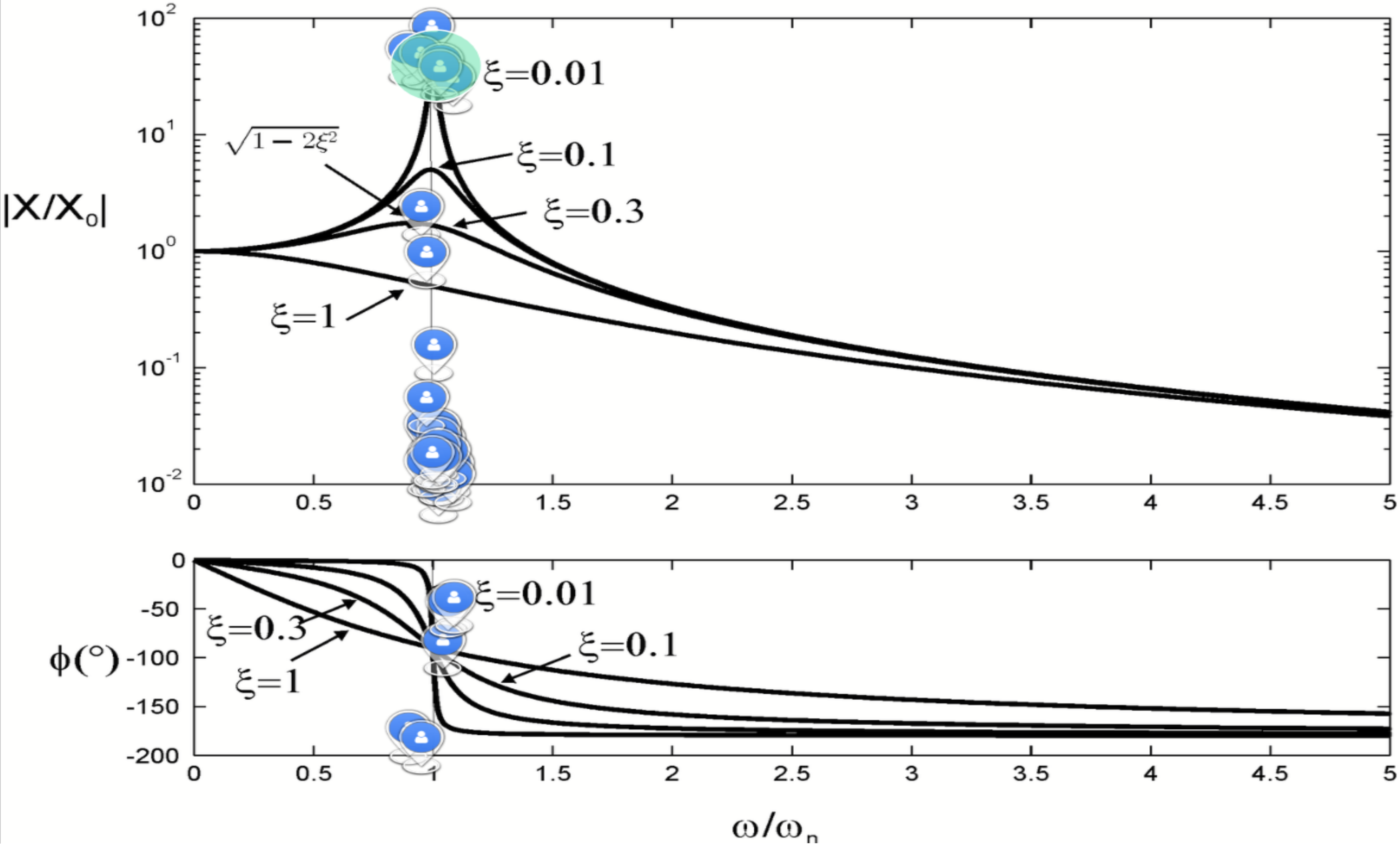
10

When damping increases in a 1DOF system, the amplitude of vibration when excited far from its natural frequency

decreases	36%	16 votes
increases	11%	5 votes
✓ remains constant	53%	24 votes

11

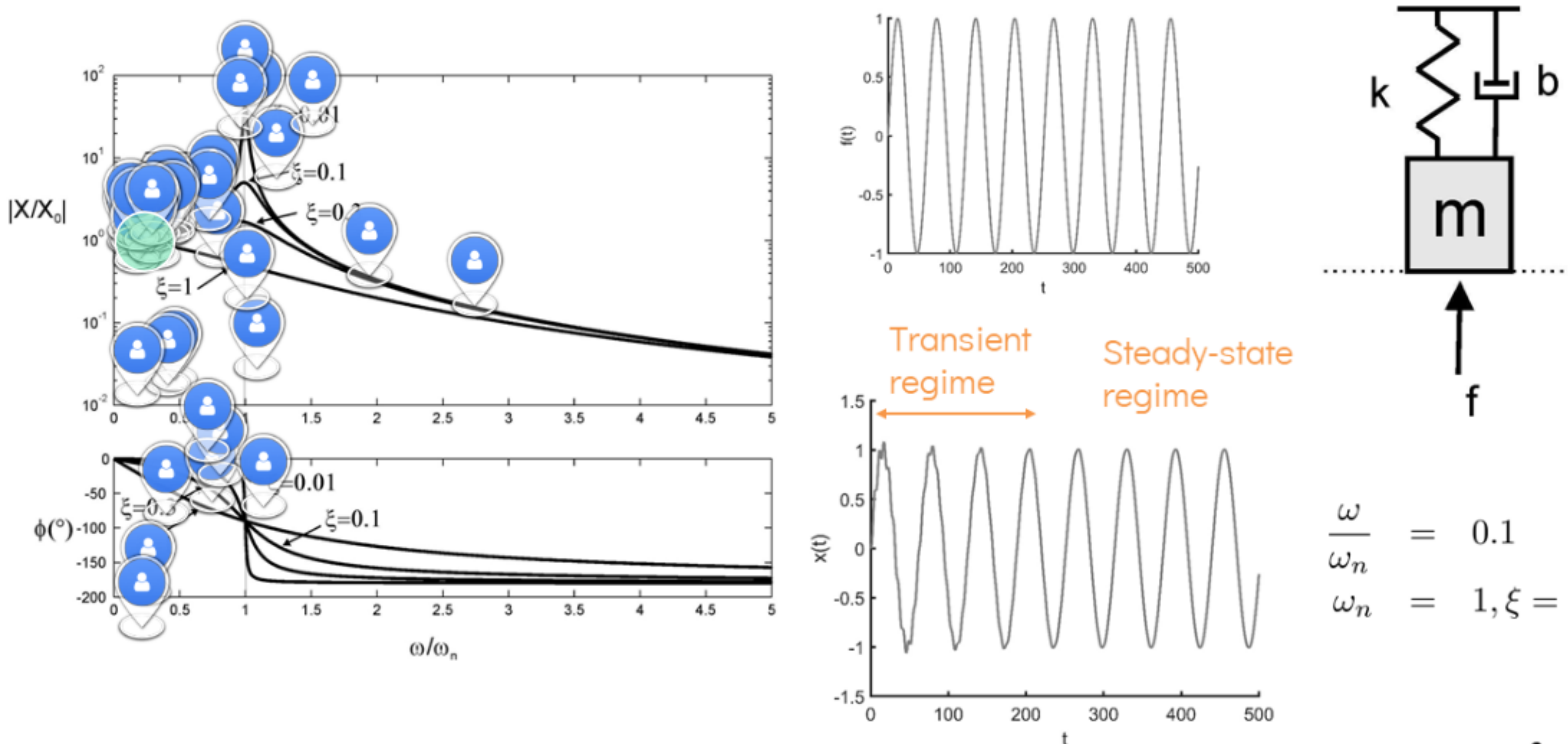
Where is the resonant frequency of the 1DOF system on this diagram ?



12

To which area of the bode plot does the time domain response presented in the graph correspond to ?

Bode plot vs time domain response



$$\frac{\omega}{\omega_n} = 0.1$$
$$\omega_n = 1, \xi = 0.01$$

6

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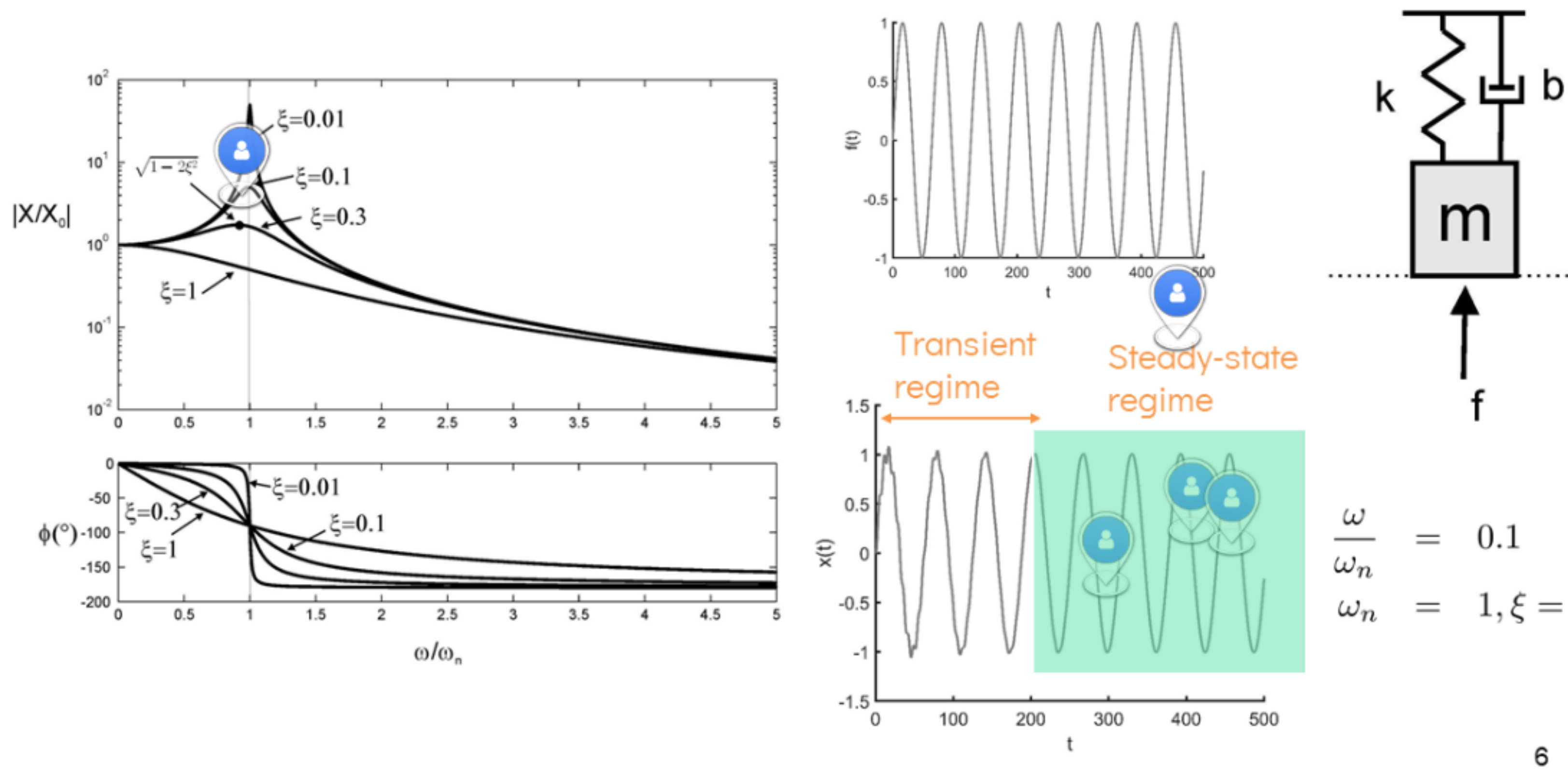
Which part of the time domain response actually corresponds to the hypothesis in the Bode plot ?

Bode plot vs time domain response



$$\frac{\omega}{\omega_n} = 0.1$$

$$\omega_n = 1, \xi = 0.01$$

14

For a sine sweep excitation, which area of the time domain response represents resonance ?