Magnetic response in three-dimensional nodal semimetals MIK-
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the magnetic response in various three-dimensional gapless systems, including Dirac
and Weyl semimetals and a line-node semimetal. We show that the susceptibility is
decomposed into the orbital term, the spin term and also the spin-orbit cross term
which is caused by the spin-orbit interaction. We show that the orbital susceptibility
logarithmically diverges at the band touching energy in the point-node case, while
it exhibits a stronger delta-function singularity in the line node case. The spin-orbit
cross term is shown to be paramagnetic in the electron side while diamagnetic in the
hole side, in contrast with other two terms which are both even functions in Fermi
energy. The spin-orbit cross term in the nodal semimetal is found to be directly
related to the chiral surface current induced by the topological surface modes.

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