Magnetic response in three-dimensional nodal semimetals MIKITO KOSHINO, INTAN FATIMAH HIZBULLAH, Tohoku University — We study 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.