The free calculus and non-isomorphism of finitely presented groups

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It is well-known that in general case determining whether or not two presentations $\mathbf{(x : r)}$ and $\mathbf{(x' : r')}$ define isomorphic groups is undecidable problem. The main goal of this talk is to demonstrate how technique named free calculus can resolve this problem for some group presentations. Using free calculus we can attach to each finitely presented group a chain of elementary ideals. Any two finite presentations of the same group have same chain of elementary ideals, thus considering these ideals we can distinguish some groups presented by generators and finitely many relations. One concrete example related to an open question will also be given.