f-rank[11,40]

f-rank{i:l}
    (x; *free*; *es*; e)
$\equiv_{\text{def}}$ if x changed before e
    then let r= f-rank{i:l}
            (x; *free*; *es*; (last change to x before e)) in
        if eq_id(es-after(*es*; x; e); *free*) then inc-fst(r) else inc-snd(r) fi
    else <0, 1>
    fi

clarification:

f-rank{i:l}
    (x; *free*; *es*; e)
$\equiv_{\text{def}}$ if changed{i:l}
        (Id; id-deq; *es*; x; e)
    then let r= f-rank{i:l}
            (x; *free*; *es*; last-change{i:l}(Id; id-deq; *es*; x; e)) in
        if eq_id(es-after(*es*; x; e); *free*) then inc-fst(r) else inc-snd(r) fi
    else <0, 1>
    fi
(recursive)