function Hensel(poly)

Z:=Integers();

term\_degrees:=[];

R<x> := PolynomialRing(Integers());

even:=0;

odd:=0;

terms\_p:= Terms(poly);

for i in [1 .. #terms\_p] do

parity:=Degree(terms\_p[i]);

if parity mod 2 eq 0 then

even+:=terms\_p[i];

else

odd+:=terms\_p[i];

end if;

end for;

odd:=odd\*(-1);

P4<x> := PolynomialRing(Integers(4));

if Degree(even) gt Degree(odd) then

f:=(even^2)-(odd^2);

else

f:=(odd^2)-(even^2);

end if;

lifted\_terms:=Terms(f);

coeff\_terms:=Coefficients(f);

non\_zero\_coeffs:=[];

for i in [1..#coeff\_terms] do

if coeff\_terms[i] ne 0 then

Append(~non\_zero\_coeffs,coeff\_terms[i]);

end if;

end for;

Z:=Integers();

goodLift:=Z ! 0;

for j in [1..#lifted\_terms] do

degShit:=(Z ! Degree(lifted\_terms[j])) div (Z ! 2);

goodLift:=goodLift+non\_zero\_coeffs[j]\*(x^degShit);

end for;

return goodLift;

end function;