```
> MignotteBound := proc(f,x)
      local d;
      d := degree(f,x);
      return 2^d*ceil(sqrt(d+1))*maxnorm(f);
  end;
```

```
MignotteBound := proc(f, x)
    local d;
    d := degree(f, x); return 2^d * ceil(sqrt(d + 1)) * maxnorm(f)
end proc
```

(1)

```
> p_adic := proc(m, u0, p)
  local u,k,a,B,ek,t,d,uk;
      `mod` := mods;
      u := u0;
      k := 1;
      a := m;
      B := MignotteBound(a, x);
      d := (-3)*(u^2) mod p;
      while true do
          ek := expand(a - u^3);
          if ek = 0 then return u; fi;
          if p^k > 2*B then return FAIL; fi;
          t := -(ek / p^k);
          if Divide(t, d, 'q') mod 5 <> true then return Fail; fi;
          uk := q;
          u := u + uk * p^k;
          k := k + 1;
      od;
  end;
```

```
p_adic := proc(m, u0, p)
    local u, k, a, B, ek, t, d, uk;
    mod := mods;
    u := u0;
    k := 1;
    a := m;
    B := MignotteBound(a, x);
    d := -3 * u^2 mod p;
    do
        ek := expand(a - u^3);
        if ek = 0 then return u end if;
        if 2 * B < p^k then return FAIL end if;
        t := -ek / p^k;
        if Divide(t, d, 'q') mod 5 <> true then return Fail end if;
        uk := q;
        u := u + uk * p^k;
        k := k + 1
    end do
end proc
```

(2)

```
> a := x^6-531*x^5+ 94137*x^4-5598333*x^3+ 4706850*x^2-1327500*x +
```

```
125000;
b := x^6-406*x^5+ 94262*x^4-5598208*x^3+ 4706975*x^2-1327375*x+
125125;
p := 5;
```

$$a := x^6 - 531\,x^5 + 94137\,x^4 - 5598333\,x^3 + 4706850\,x^2 - 1327500\,x + 125000$$

$$b := x^6 - 406\,x^5 + 94262\,x^4 - 5598208\,x^3 + 4706975\,x^2 - 1327375\,x + 125125$$

$$p := 5 \tag{3}$$

```
> factor(a);
p_adic(a, u0, p);
```

$$\left(x^2 - 177\,x + 50\right)^3$$

$$x^2 - 177\,x + 50 \tag{4}$$

```
> factor(b);
p_adic(b, u0, p);
```

$$x^6 - 406\,x^5 + 94262\,x^4 - 5598208\,x^3 + 4706975\,x^2 - 1327375\,x + 125125$$

$$Fail \tag{5}$$