

Example 3.6 of SvN&A

```
> B := -388; (cm^3/mol)
   C := -26000; (cm^3/mol)^2
   R := 83.14; (cm^3-bar/mol-K)T
                                     B := -388
                                     C := -26000
                                     R := 83.14
> T := 473.15; (K)
   P := 10; (bar)
                                     T := 473.15
                                     P := 10
```

Ideal gas law

```
> V_id := R*T/P;
   Z_id := P*V_id/R/T;
                                     V_id := 3933.769100
                                     Z_id := 1.000000000
```

2nd virial, volume explicit

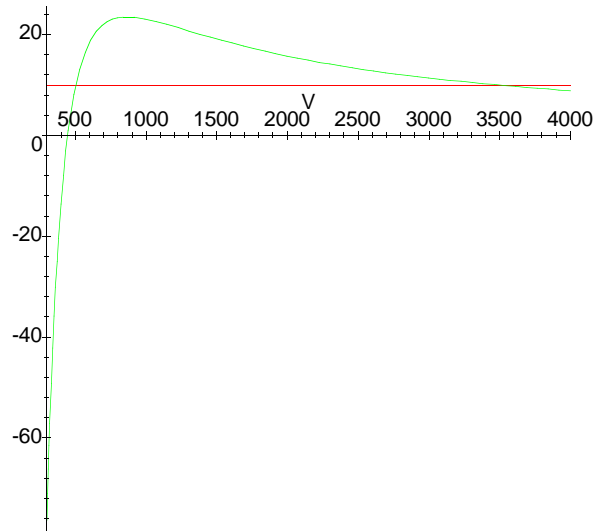
```
> V_2 := R*T/P + B;
   Z_2 := P*V_2/R/T;
                                     V_2 := 3545.769100
                                     Z_2 := .9013668596
```

3rd virial, pressure explicit, iteration

```
> V_3 := V_2; initial guess
   V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3545.769100
                                     V_3 := 3495.176668
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3488.708615
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3487.867924
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3487.758421
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3487.744154
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3487.742295
> V_3 := R*T/P * (1 + B/V_3 + C/V_3^2);
                                     V_3 := 3487.742053
> Z_3 := P*V_3/R/T;
                                     Z_3 := .8866158548
```

3rd virial, pressure explicit, solve function

```
> solve(V = R*T/P * (1 + B/V + C/V^2), V);
                                     -58.16261103, 504.1896947, 3487.742016
> plot({P, R*T*(1/V + B/V^2 + C/V^3)}, V=300..4000);
```



[>