```
> #
  https://www.mapleprimes.com/questions/234277-How-To-Solve-A-Cubic-Assuming-Discriminant
> restart;
>
> f := 2*y^3*z - y^2 -2*m;
  #F:=unapply(f, y);
```

$$f := 2\,y^3\,z - y^2 - 2\,m$$

```
> assume(m<0, 0<z);
> discrim(f,y); signum(%); convert(%, piecewise, m);
```

$$-8\,m\,(54\,m\,z^2 + 1)$$

$$\mathrm{signum}(54\,m\,z^2 + 1)$$

$$\begin{cases} -1 & m < -\dfrac{1}{54\,z^2} \\ 0 & m = -\dfrac{1}{54\,z^2} \\ 1 & -\dfrac{1}{54\,z^2} < m \end{cases}$$

```
> # translate "0 < discrim(f,y)"
  additionally(-1/(54*z^2) < m);
> #getassumptions({m,z});
> diff(f, y);
  Q:=[solve(%)]; # local extrema
```

$$6\,y^2\,z - 2\,y$$

```
Warning, solve may be ignoring assumptions on the input
variables.
```

$$Q := \left[\{ y = 0, z = z \}, \{ y = \frac{1}{3\,z}, z = z \} \right]$$

```
> eval(f, Q[1]); signum(%);
```

$$-2\,m$$

$$1$$

```
> eval(f, Q[2]); normal(%); # = discrim(f,y) * factors with known signs
  signum(%);
```

$$-\frac{1}{27\,z^2} - 2\,m$$

$$-\frac{54\,m\,z^2 + 1}{27\,z^2}$$

$$-1$$

```
> limit(f, y=-infinity);
```

```
limit(f, y=+infinity);
```

$$-\infty$$

$$\infty$$

Thus f comes from -oo, takes a positive value in y=0 and a negative value in the positive y= 1/(3*z) and runs to +oo.
Hence it has 3 real zeros.

```
>
```