

https://github.com/t-o-k/Maxima-bezier/bezier_curve_3d.wmx

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```
(%i1) load("draw")$

(%i2) load("bezier")$

(%i3) define(
      curve_x(s),
      bezier_function_1a(matrix([ +0, +2, +6, +5 ]), s)
)$

(%i4) define(
      curve_y(s),
      bezier_function_1a(matrix([ +2, -1, +6, +0 ]), s)
)$

(%i5) define(
      curve_z(s),
      bezier_function_1a(matrix([ +1, -3, +2, +0 ]), s)
)$

(%i6) expand(curve_x(s));
(%o6)  $-7s^3 + 6s^2 + 6s$ 

(%i7) expand(curve_y(s));
(%o7)  $-23s^3 + 30s^2 - 9s + 2$ 

(%i8) expand(curve_z(s));
(%o8)  $-16s^3 + 27s^2 - 12s + 1$ 

(%i9) define(
      diff_curve_x(s),
      diff(curve_x(s), s)
)$

(%i10) define(
      diff_curve_y(s),
      diff(curve_y(s), s)
)$
```

```
(%i11) define(
      diff_curve_z(s),
      diff(curve_z(s), s)
    )$

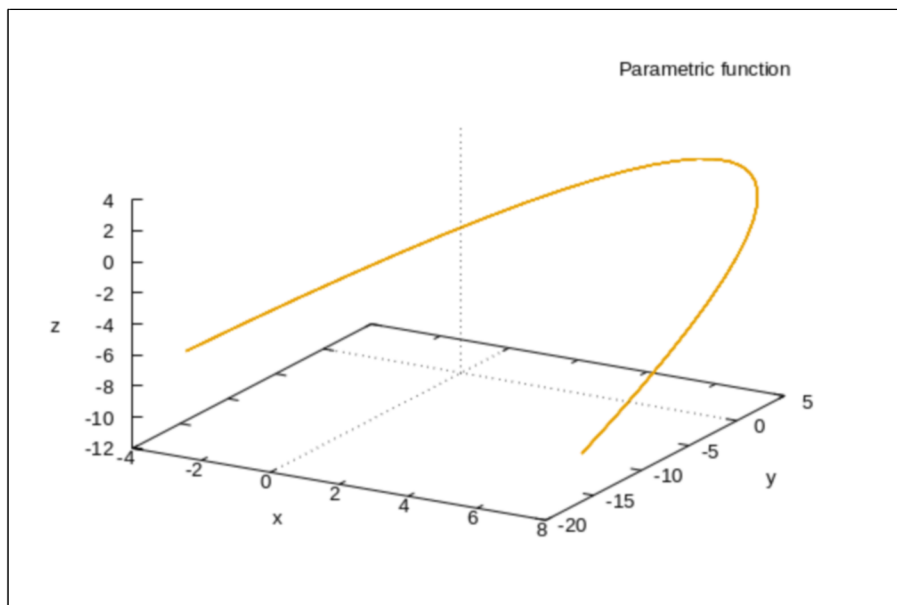
(%i12) expand(diff_curve_x(s));
(%o12)  $-21s^2 + 12s + 6$ 

(%i13) expand(diff_curve_y(s));
(%o13)  $-69s^2 + 60s - 9$ 

(%i14) expand(diff_curve_z(s));
(%o14)  $-48s^2 + 54s - 12$ 

(%i16) wxplot3d(
      [
        diff_curve_x(s),
        diff_curve_y(s),
        diff_curve_z(s)
      ],
      [ s, 0, 1 ],
      [ t, 0, 1 ]
    );
```

(%t16)



(%o16)