Re: Lagrange Multiplier Problem, three variables

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- *From*: Jean−Marc Gulliet <jeanmarc.gulliet@xxxxxxxxx>

- *Date*: Sun, 13 Aug 2006 12:04:01 +0200

JTolman wrote:

> Jean−Marc Gulliet wrote:
>
> > Assigning a value to lambda might help?
> >
> > eqn1= 2/ x^3== \[Lambda] y z;
> > eqn2= 2/ y^3 == \[Lambda] x z;
> > eqn3= 2/ z^3== \[Lambda] x y;
> > N@ Solve[{ eqn1,eqn2,eqn3}, { x,y,z}]/. \[Lambda]−>1
>
> For the numbers I tried I got complex numbers, which I am fairly
> certain wouldn't be valid for the application problem I am working on.
>
> > Also, you could try Reduce:
> >
> > −−> ((x == −1.1486983549970349 && (y == x || y == −1.*x)) || (x ==
> > 1.148698354997035 && (y == −1.*x || y == x))) && z == 2./(x*y^3)
>
> Am I interpreting this right, (−1.14869, x, 2/xy^3, (−1.14869, −x, 2/x
> y ^3), (1.14869, x, 2/x y ^3), (1.14869, −x, 2/x y ^3)
>
> And this is the solution for lambda = 1, but I thought the way lagrange
> multipliers worked you had to actually solve for lambda, you couldn't
> just plug any number in?
>
> > HTH,
> > Jean−Marc

Sorry about that, I forgot that you were solving w/ the Lagrange multiplier.

f[x_,y_,z_]:= 1/ x^2+ 1/ y^2+ 1/ z^2
g[x_,y_,z_]:= x y z−v

```
sols= Reduce[ D[ f[ x,y,z], { { x,y,z}}]== \[Lambda] D[ g[ x,y,z], { { x,y,z}}]&& x>0&& y>0&& z>0&& x y z==v&& v>0, { x,y,z,\[Lambda]}]
```

returns

```
v > 0 && x == Root[−v + #1^3 & , 1] && y == v/x^2 && z == v/(x*y) && \[Lambda] == −(2/(x*y*z^3))
```

You can just "discard" \[Lambda] since x, y, and z are independent of it.

HTH,
Jean−Marc
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