**[2.9] Find more symbolic integrals, faster, with Real mode and constraints**

Finding symbolic integrals can be more successful when you use constraints and set the Complex Format to Real instead of Rectangular or Polar. This integral is a good example:

$$\int_0^{\infty}\left(t^2 e^{-st}\right)dt$$

which is entered as

```
∫(t^2*e^(-s*t),t,0,∞)
```

If the mode is set to Rectangular or Real, *undef* is returned. If we constrain the soluton for s>0, like this:

```
∫(t^2*e^(-s*t),t,0,∞)|s>0
```

but leave the complex format set to rectangular, the 89/92+ is 'busy' for a long time, then returns the original integral. However, if we constrain the solution to s>0 *and* set the mode to Real, the calculator quickly returns the correct answer: $2/s^3$.

Here is another integral that is sensitive to mode settings:

$$\int_{-\infty}^{\infty}\frac{1}{4\pi(p^2+z^2)^{1.5}}dz=\frac{1}{2\pi p^2}$$

which is entered as

```
∫(1/(4*π*(p^2+z^2)^(1.5)),z,-∞,∞)
```

I get these results on my TI-92 w/Pluse module, AMS 2.03. Real and Rectangular are the Complex Format mode settings, and Exact and Approx are the Exact/Approx mode settings.

- Real, Exact: returns answer quickly
- Rectangular, Exact: returns answer, not as fast; warning message: "Memory full, some simplification might be incomplete"
- Real, Approx: can't find integral
- Rectangular, Approx: can't find integral

Mode settings of Real, Exact seem to be the best starting point for symbolic integration.

So the moral of the story is this: if the 89/92+ won't evaluate your integral, try various complex modes and constraints.

*(I lost my note for the credit on this one. Sorry - it's a good one!)*