Homework #2

2. 1. Consider the function $f(t) = e^{\lambda t}$. Evaluate:

a) its Riemann-Liouville derivative ${}_0D_t^\alpha f(t)$

b) its Caputo derivative ${}_0^C D_t^\alpha f(t)$.

Which derivative is bounded at $t = 0$?

2. 2. Consider the function $g(t) = t^{\alpha-1} E_{\alpha,\alpha}(-t^{\alpha})$.

Find its Riemann-Liouville derivative ${}_0D_t^{\alpha} g(t)$.

2. 3. Find the inverse Laplace transforms of

a) $$Y(s) = \frac{s^{\alpha-1}}{s^{\alpha} + b}$$

b) $$H(s) = \frac{1}{as^{\alpha} + bs^{\beta}}$$

2. 4. Find the inverse Laplace transforms of

a) $$Q(s) = \frac{1}{s + 5s^{0.5} + 6}$$

b) $$R(s) = \frac{A\sqrt{s}}{s\sqrt{s} + 1} + \frac{2\sqrt{s}}{s^3(s\sqrt{s} + 1)}$$