Calculeu el pH d' una dissolució ca = 0.1 M d' àcid H2A

Dades: $k1 = 10^{-4}$; $k2 = 10^{-5}$; $ca = 0.1$; $kw = 10^{-14}$;

(* Amb Eliminate *)

```
ClearAll["Global`*"];
eq = Eliminate[{kw == oh * h,
                k1 == ha * h / h2a,
                k2 == a * h / ha,
                h == oh + ha + 2 * a,
                ca == h2a + ha + a}, {a, ha, h2a, oh}]
k1 = 10^-4; k2 = 10^-5; ca = 0.1; kw = 10^-14;
sol1 = Solve[eq, h]
Print["pH = ", -Log[10, sol1[[4, 1, 2]]]]
```

$h^4 + h^3 \, k1 + h^2 \, k1 \, k2 - h^2 \, kw - h \, k1 \, kw - k1 \, k2 \, kw == ca \, h \, k1 \, (h + 2 \, k2)$

$\{\{h \to -0.00320263\}, \{h \to -0.0000199988\}, \{h \to -5. \times 10^{-14}\}, \{h \to 0.00312262\}\}$

pH = 2.50548

(*Amb Eliminate més Solve amb condicions de solució positiva*)

```
sol2 = Solve[{eq, h > 0}, h]
Print["pH = ", -Log[10, sol2[[1, 1, 2]]]]
```

$\{\{h \to 0.00312262\}\}$

pH = 2.50548

(*Directament Solve i condicions solucions positives*)

```
ClearAll["Global`*"];
k1 = 10^-4; k2 = 10^-5; ca = 0.1; kw = 10^-14;
sol3 = Solve[{kw == oh * h,
              k1 == ha * h / h2a,
              k2 == a * h / ha,
              h == oh + ha + 2 * a,
              ca == h2a + ha + a,
              a > 0, ha > 0, h2a > 0, oh > 0, h > 0}, {h, a, ha, h2a, oh}]
Print["pH = ", -Log[10, sol3[[1, 1, 2]]]]
```

$\{\{h \to 0.00312262, a \to 9.93636 \times 10^{-6}, ha \to 0.00310275, h2a \to 0.0968873, oh \to 3.20243 \times 10^{-12}\}\}$

pH = 2.50548