```
(* Parms and constrains,
peak1 > 0, the time at which the peak response starts,
dur > 0, the duration of the peak response,
maxy ∈ Reals, the maximum (or minimum if <0) response during the peak period,
k ∈ Reals, initial increase or decline rate prior to peak,
K ∈ Reals, increase or decline rate after peak,
B ∈ Reals, asymptotic response far after pulse has occured. *)

(* Parms to potential model as function of pulse-level covariates: log(peak1),
log(dur), maxy [maxy could be - or +],
Parms to potentially treat as random effects, vary pulse,
model hierarhicaly around higher levels such as study ID, etc.: k, K, B
*)
```
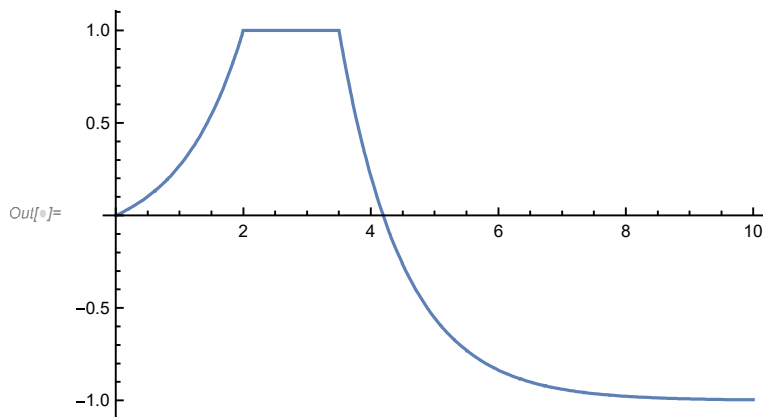
$In[\circ]:=$
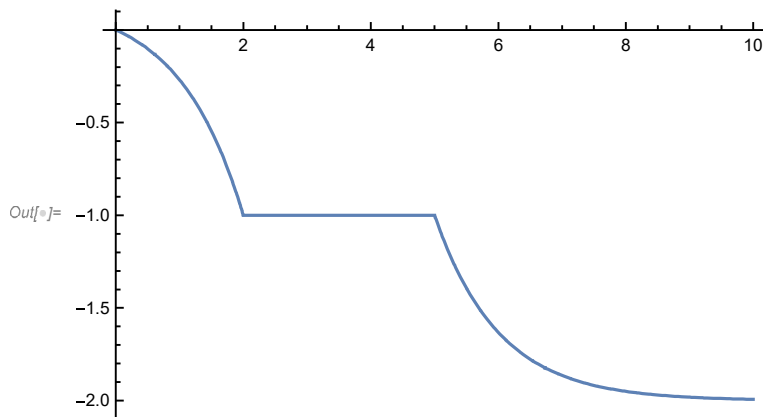$$F4[peak1\_, dur\_, maxy\_, k\_, K\_, B\_, x\_] :=$$
$$If\left[x < peak1, \frac{(-1 + e^{k\,x})\,maxy}{-1 + e^{k\,peak1}}, If\left[x < peak1 + dur, maxy, B + e^{K\,(-(dur+peak1)+x)}\,(-B + maxy)\right]\right]$$

```
(* Example plots *)
```

$In[\circ]:=$ `Plot[F4[2, 1.5, 1, 1, -1, -1, x], {x, 0, 10}]`

$Out[\circ]=$

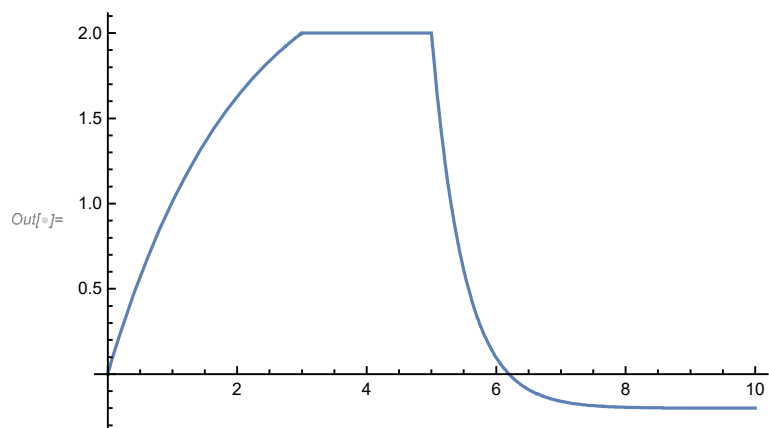$In[\circ]:=$ `Plot[F4[2, 3, -1, 1, -1, -2, x], {x, 0, 10}]`

$Out[\circ]=$

In[ ]:= `Plot[F4[2, 3, -1, 1, -1, 2, x], {x, 0, 10}]`

Out[ ]=
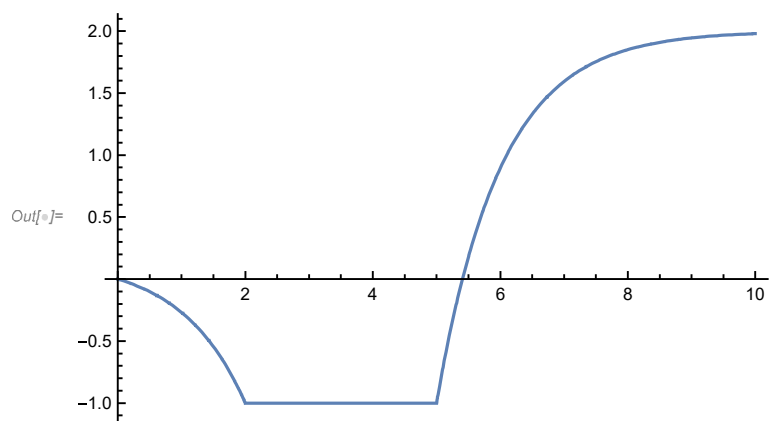
`Plot[F4[3, 2, 2, 1, -1, 0, x], {x, 0, 10}](* Fairly symetric decays as abs(k) = abs(K) *)`

Out[ ]=
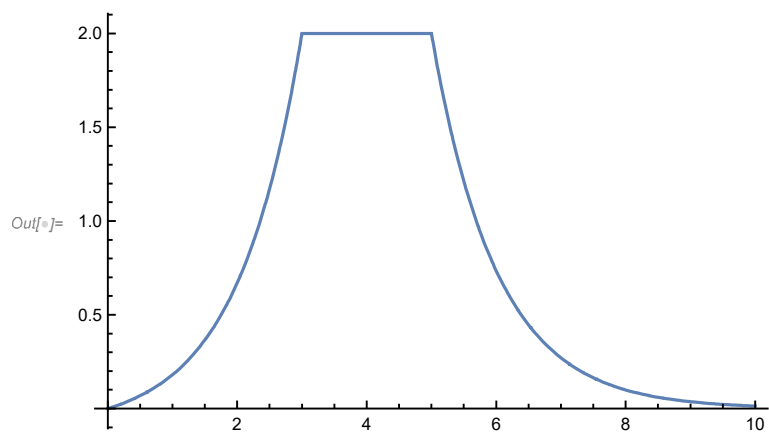
In[ ]:= `Plot[F4[3, 2, 2, -.5, -2, -.2, x], {x, 0, 10}]`

Out[ ]=

In[ ]:= **Plot[F4[3, .5, 2, 2, − .5, 1, x], {x, 0, 10}]**

Out[ ]=