

```

Exit[]

$Assumptions =  $\mu > 0 \ \&\& \ \sigma > 0 \ \&\& \ a \in \text{Reals} \ \&\& \ 1 > k_1 \geq 0 \ \&\& \ k_0 \geq 0 \ \&\& \ S_0 > 0 \ \&\& \ K > 0 \ \&\& \ r \geq 0 \ \&\& \ b \in \text{Reals} \ \&\& \ r_f \geq 0 \ \&\& \ \gamma > 0;$ 

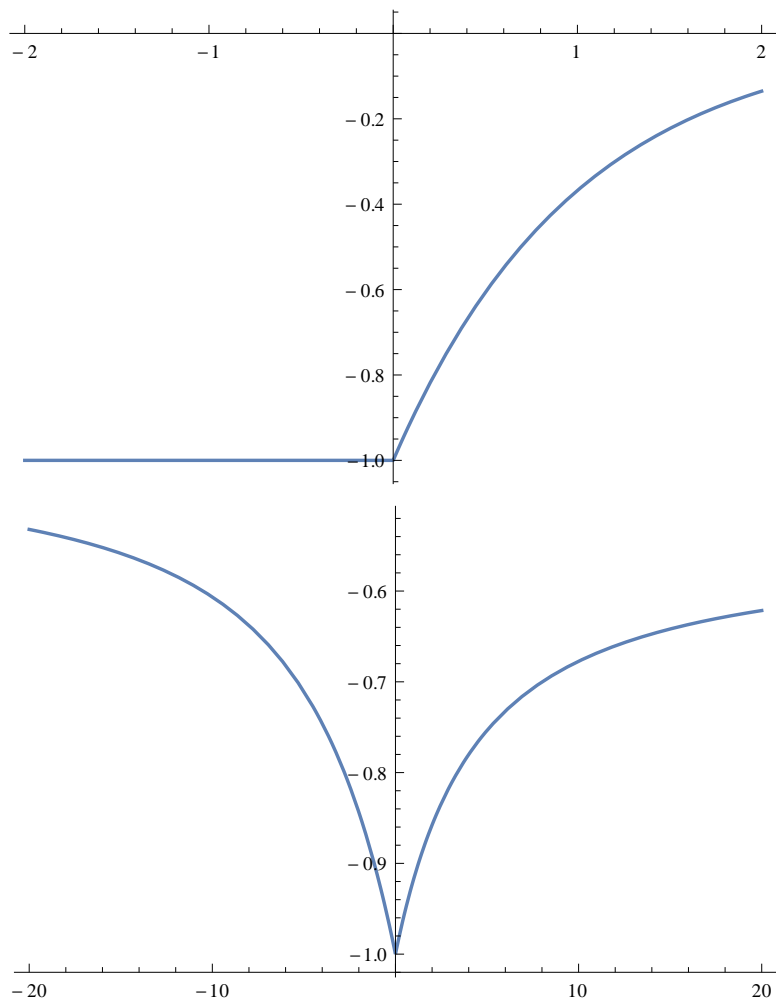
u[x_] := Module[{W = x}, If[W < 0, -1, -Exp[- $\gamma$  W]]]
(*for W=x we get infinite position size*)

pr[B_] :=  $e^{-B^2/2} / \sqrt{2\pi}$ 

xx[B_] := Exp[ $\sigma \text{Sqrt}[t] B + (\mu - \sigma^2/2) t$ ];
NIntegrate[xx[B] pr[B], {B, - $\infty$ ,  $\infty$ }] - 1
Plot[u[W], {W, -2, 2}]
 $\gamma = 1.; \mu = 0; t = 1; \sigma = .25;$ 
U[a_] := NIntegrate[u[a (xx[B] - 1)] pr[B], {B, - $\infty$ ,  $\infty$ }]
Plot[U[a], {a, -20, 20}]

 $-2.62457 \times 10^{-13}$ 

```



```

U2[a_, k_, p_, d_] := NIntegrate[(
  p u[d / p - k + a (xx[B] - 1)] + (1 - p) u[-d / (1 - p) - k + a (xx[B] - 1)]
) pr[B], {B, - $\infty$ ,  $\infty$ }]

```

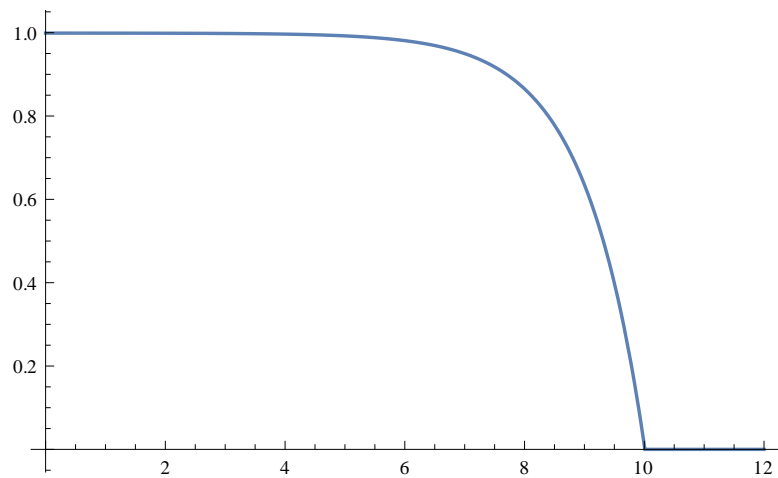
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d = 10; p = .999; d / p
-d / (1 - p)
Quiet[FindRoot[U2[0, k, p, d] == U[0], {k, 9, 11}]]
10.01
-10 000.
{k → 11.}

U2[0, 10.010010010010009, p, d] - U[0]
1.55431 × 10-15

Plot[U2[0, k, p, d] - U[0], {k, 0, 12}, PlotRange → All]

```



k = 0

