With a Cap in the integration boundary (?, not sure anymore)

```
Exit[]
```

```
D[Max[0, (1 - Exp[-a xx[w t, t] - s]) Exp[-w^2 / 2]], a]
```

$$\begin{cases} e^{-a\left(-1+e^{\left(-\frac{1}{2}+mpr\right)t^2+t\,w}\right)-s-\frac{w^2}{2}}\left(-1+e^{a\left(-1+e^{\left(-\frac{1}{2}+mpr\right)t^2+t\,w}\right)+s}\right) & -e^{-\frac{w^2}{2}}+e^{-a\left(-1+e^{\left(-\frac{1}{2}+mpr\right)t^2+t\,w}\right)-s-\frac{w^2}{2}}<0 \\ \left(1-e^{\left(-\frac{1}{2}+mpr\right)t^2+t\,w}\right)+e^{-\frac{w^2}{2}}\left(-1+e^{\left(-\frac{1}{2}+mpr\right)t^2+t\,w}\right) & \text{True} \\ 0 & \end{cases}$$

```
$Assumptions = s > 0 && t > 0 && b > 0 && μ > 0 && σ > 0 && a ∈ Reals &&
   1 > k1 ≥ 0 && k0 ≥ 0 && S0 > 0 && K > 0 && r ≥ 0 && b ∈ Reals && rf ≥ 0 && γ > 0;

xx[W_, t_] := Exp[ W + (mpr - 1 / 2) t^2] - 1;

w1[a_, t_, s_] := If[a > s, (t^2 - 2 mpr t^2 + 2 Log[(a - s)/a])/(2 t), -∞];

w2[a_, t_, s_] := If[a ≤ 0, (t^2 - 2 mpr t^2 + 2 Log[(a - s)/a])/(2 t), ∞];

mpr =.; Simplify[a xx[w1[a, t, s] t, t] + s ≥ 0]
Simplify[a xx[w2[a, t, s] t, t] + s]
```

True

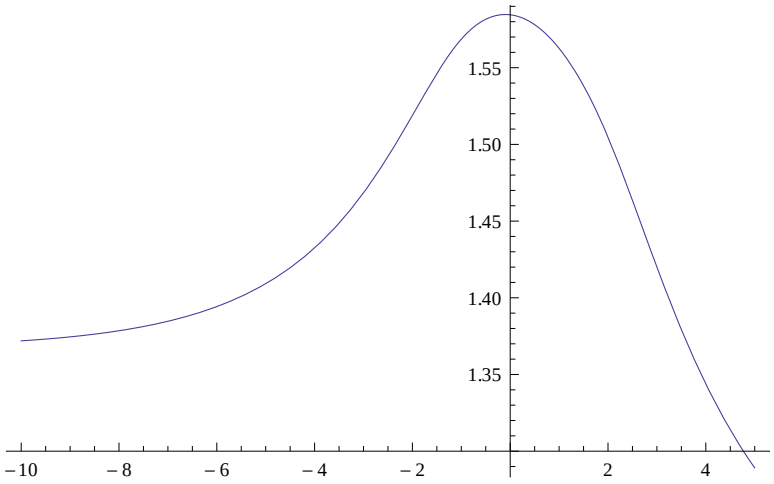
$$\begin{cases} s+a\,\infty & a>0 \\ 0 & \text{True} \end{cases}$$

```
g[a_, t_, s_] := Sqrt[π/2] (Erf[w2[a, t, s]/Sqrt[2]] - Erf[w1[a, t, s]/Sqrt[2]]) -
   NIntegrate[Exp[-a xx[w t, t] - s - w^2 / 2], {w, w1[a, t, s], w2[a, t, s]}];
gs[a_, t_, s_] := NIntegrate[xx[w t, t] Exp[-a xx[w t, t] - s - w^2 / 2],
   {w, w1[a, t, s], w2[a, t, s]}];
g2[a_, t_, s_] := NIntegrate[Max[0, (1 - Exp[-a xx[w t, t] - s]) Exp[-w^2 / 2]],
   {w, -∞, ∞}];
as[t_, s_] := Quiet[FindRoot[gs[a, t, s] == 0, {a, -1, 1}][[1, 2]]]

as[1, 1.]
```

0.277783

```
mpr = -.1; Plot[{g[a, .2, 1]}, {a, -10, 5}]
```




```
Plot[Exp[-x], {x, 0, 5}]
```