

```

Exit[]

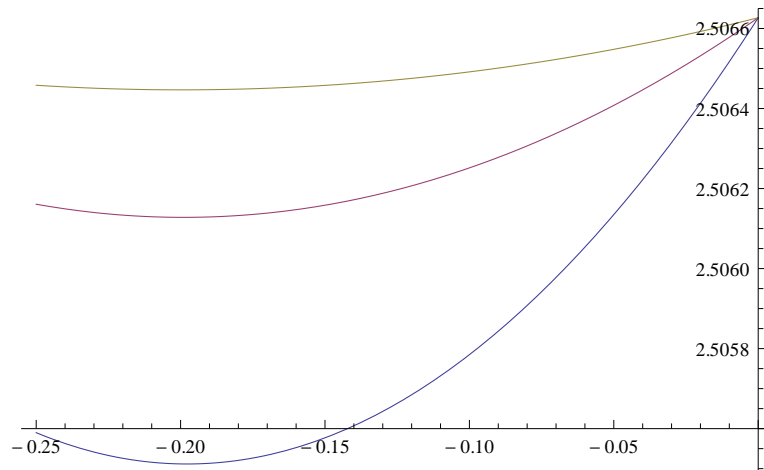
$Assumptions = b > 0 && mpr < 0 &&  $\mu$  > 0 &&  $\sigma$  > 0 && a  $\in$  Reals &&
  1 > k1  $\geq$  0 && k0  $\geq$  0 && S0 > 0 && K > 0 && r  $\geq$  0 && b  $\in$  Reals && rf  $\geq$  0 &&  $\gamma$  > 0;

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

 $\gamma$  = .2; mpr = -0.2;
g[a_, t_, b_] := NIntegrate[Exp[-a xx[w t, t] - w^2/2], {w, -b, b}];
gs[a_, t_, b_] := NIntegrate[Exp[-a xx[w t, t] - w^2/2] xx[w t, t], {w, -b, b}];
h[a_, w_, t_] :=
  Exp[-w^2/2/t^2]/t (Exp[-a xx[w, t]] xx[w, t] + Exp[-a xx[-w, t]] xx[-w, t])
gs2[a_, t_, b_] := NIntegrate[h[a, w, t], {w, 0, t b}]
as[t_, b_] := Quiet[FindRoot[gs[a, t, b] == 0, {a, -1, 0}][[1, 2]]]

b = 5; t = .1; Plot[{g[a, t 1.5, b], g[a, t, b], g[a, t .6, b]}, {a, -.25, 0}]

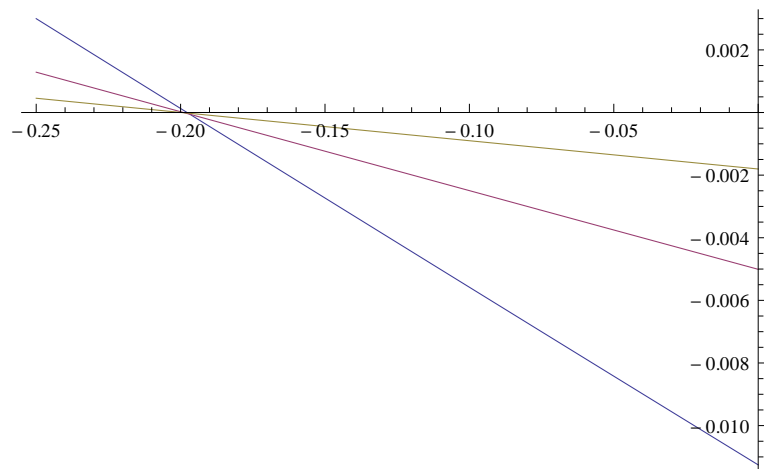
```



```

b = 5; t = .1; Plot[{gs[a, t 1.5, b], gs[a, t, b], gs[a, t .6, b]}, {a, -.25, 0}]

```



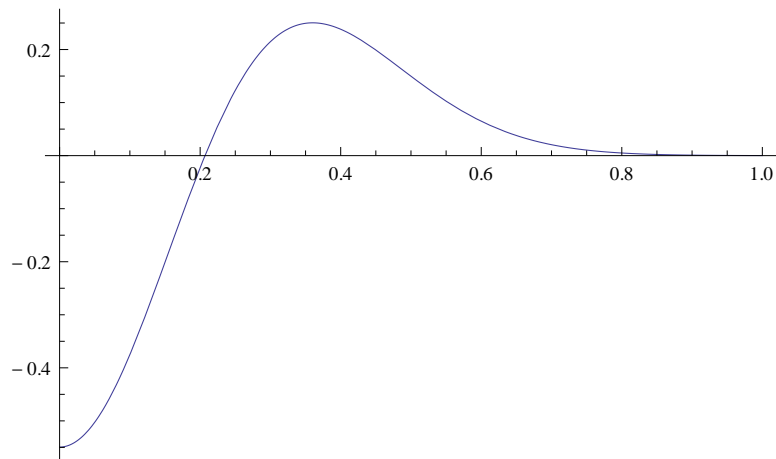
```
as[.1, b]
```

```
-0.994986
```

```
gs2[mpr, t, b]
```

```
0.00216389
```

```
t = .2; mpr = -1; a = mpr; Plot[{h[a, w, t]}, {w, 0, t b}, PlotRange -> All]
```



```
a = -.19901; NIntegrate[
  Exp[-w^2 / 2 / t^2] / t (Exp[-a xx[w, t]] xx[w, t] + Exp[-a xx[-w, t]] xx[-w, t])
, {w, 0, t b}]
```

```
-1.70561 × 10-8
```

```
mpr = .;
```

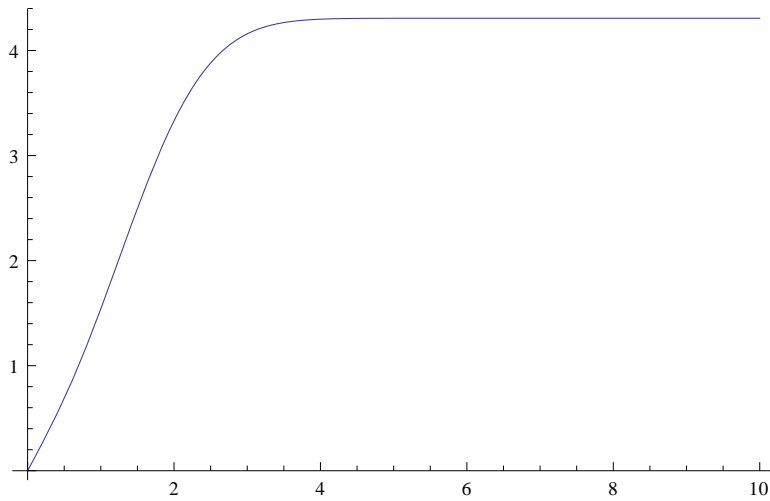
```
ds = Table[as[1 / n, b / n], {n, 1, 60}]
```

```
{-0.0525742, -0.154073, -0.458295, -0.948096, -1.59442, -2.38981, -3.33203,
-4.42028, -5.6542, -7.03363, -8.55848, -10.2287, -12.0442, -14.0051, -16.1112,
-18.3626, -20.7594, -23.3014, -25.9886, -28.8212, -31.799, -34.922, -38.1904,
-41.604, -45.1629, -48.867, -52.7164, -56.7111, -60.851, -65.1362, -69.5666,
-74.1424, -78.8633, -83.7296, -88.7411, -93.8979, -99.1999, -104.647,
-110.24, -115.978, -121.861, -127.889, -134.063, -140.381, -146.846, -153.455,
-160.21, -167.109, -174.155, -181.345, -188.681, -196.162, -203.788,
-211.559, -219.476, -227.538, -235.745, -244.098, -252.596, -261.239}
```

```
Integrate[xx[w, 1] Exp[-w^2 / 2], {w, -b, b}]
```

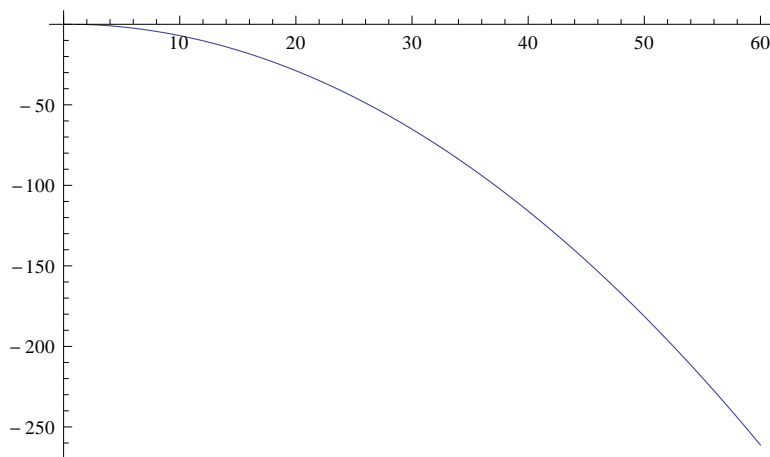
$$\sqrt{\frac{\pi}{2}} \left( -2 \operatorname{Erf}\left[\frac{b}{\sqrt{2}}\right] + e^{\operatorname{mpr}} \left( \operatorname{Erf}\left[\frac{-1+b}{\sqrt{2}}\right] + \operatorname{Erf}\left[\frac{1+b}{\sqrt{2}}\right] \right) \right)$$

```
mpr = 2 / 2; Plot[ $\sqrt{\frac{\pi}{2}} \left( -2 \operatorname{Erf}\left[\frac{b}{\sqrt{2}}\right] + e^{\text{mpr}} \left( \operatorname{Erf}\left[\frac{-1+b}{\sqrt{2}}\right] + \operatorname{Erf}\left[\frac{1+b}{\sqrt{2}}\right] \right) \right), \{b, 0, 10\}]$ 
```



```
Exit[]
```

```
ListLinePlot[ds, PlotRange -> All]
```



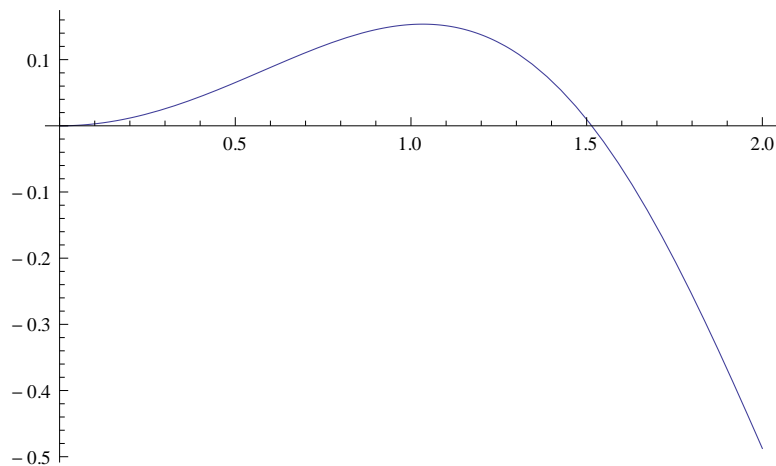
```
gs2[a_, t_] := NIntegrate[Exp[-a (Exp[-t w] - 1) - w^2 / 2] (1 - Exp[-t w]) +  
  Exp[-a (Exp[t w] - 1) - w^2 / 2] (1 - Exp[t w]), {w, 0, \infty}];
```

```
Integrate[Exp[t w - w^2 / 2], {w, -\infty, \infty}]
```

```
 $e^{\frac{t^2}{2}} \sqrt{2 \pi}$ 
```

```
h[w_] := Exp[-a (Exp[w] - 1)] (Exp[w] - 1)
```

```
a = .7 / 2; Plot[h[x] + h[-x] /. x -> w, {w, 0, 2}, PlotRange -> All]
```



```
ie[s_, a_] := (a (s - 1) - 1) + (2 a - a^2 (s - 1)) s
```

```
a /. Solve[0 == ie[s, a], a]
```

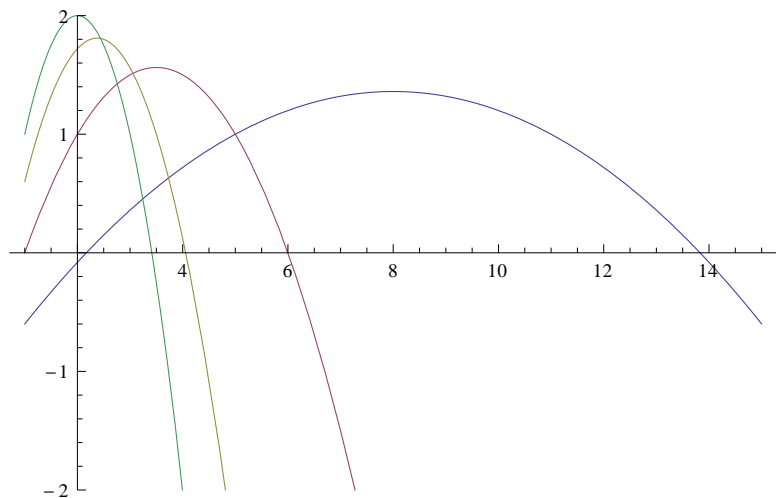
```
Limit[#, {s -> 1}] & /@ %
```

$$\left\{ \frac{-1 + 3s - \sqrt{1 - 2s + 5s^2}}{2(-s + s^2)}, \frac{-1 + 3s + \sqrt{1 - 2s + 5s^2}}{2(-s + s^2)} \right\}$$

$$\left\{ \left\{ \frac{1}{2} \right\}, \{\infty\} \right\}$$

```
asd = Simplify[Table[ie[s, a], {a, {.2, 1/2, .8, 1}}];
```

```
Plot[asd, {s, 1, 15}, PlotRange -> {-2, 2}]
```



```
u[s_] := -Exp[-a (s - 1)] (s - 1)
```

```
D[u[s], {s, 1}]
```

```
D[u[s], {s, 2}]
```

$$-e^{-a(-1+s)} + a e^{-a(-1+s)} (-1+s)$$

Simplify  $\left[ D \left[ \text{Exp} \left[ -w^2 / 2 / t^2 \right] / t, t \right] \right]$

$$\frac{e^{-\frac{w^2}{2t^2}} (-t^2 + w^2)}{t^4}$$