```
Exit[]
```

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

$$\text{ost} == \sigma \sqrt{t}\ ;\ \text{mpr} == \frac{\mu - r}{\sigma^2};$$

```
xx[W_, mpr_, ost_] := Exp[ ost W + (mpr - 1 / 2) ost^2];
Δ[k_] := 1 / 2 (1 + Erf[(- Log[k] + ost^2 / 2) / ost]) - 1 // N
Δ[0.] = 0;
```

```
γ = .1; mpr = 0.1; ost = .01;
NIntegrate[xx[w, mpr, ost] Exp[-w^2 / 2], {w, -∞, ∞}] / Sqrt[2 π] - Exp[mpr ost^2]
```

```
pr[f_] :=
  Log[NIntegrate[Exp[-γ f[xx[w, mpr, ost]] - w^2 / 2], {w, -∞, ∞}] / Sqrt[2 π]] / -γ;
opt2[f_] := NIntegrate[Exp[-γ f[xx[w, mpr, ost]] - w^2 / 2]
    (xx[w, mpr, ost] - 1), {w, -∞, ∞}];
opt[f_] := Min[.1, Max[-.1, opt2[f]]]

h[a_] := a (# - 1) &
put[k_, a_] := h[a][#] - Max[0, k - #] &;
```

$$-6.54587 \times 10^{-13}$$

```
γ = .1; mpr = 0.1; ost = 1; arb = Quiet[FindRoot[opt2[h[b]] == 0, {b, 0, 10}][[1, 2]]]
hedge[k_] :=
 If[opt2[put[k, 0]] ≤ 0, 0, FindRoot[opt2[put[k, a]] == 0, {a, 0, 10}][[1, 2]]]

plot[kl_] := Module[{x = Quiet[hedge[#]] & /@ kl, y, i = 1},
  y = Max[x];
  Show[ParallelTable[With[{j = i++},
     Plot[pr[put[k, a]] - put[k, a][1], {a, 0, 3 y},
      PlotStyle → {ColorData[1, "ColorList"][[j]]}
     ]], {k, kl}],
   PlotRange → All,
   Epilog → Flatten[{Directive[{Dashed, Red}],
      Table[
       {Point[{x[[i]], 0}],
        Point[{x[[i]], pr[put[kl[[i]], x[[i]]]] - put[kl[[i]], x[[i]]][1]}]}
       , {i, Length[kl]}]}]
  ]]
```

0.621583

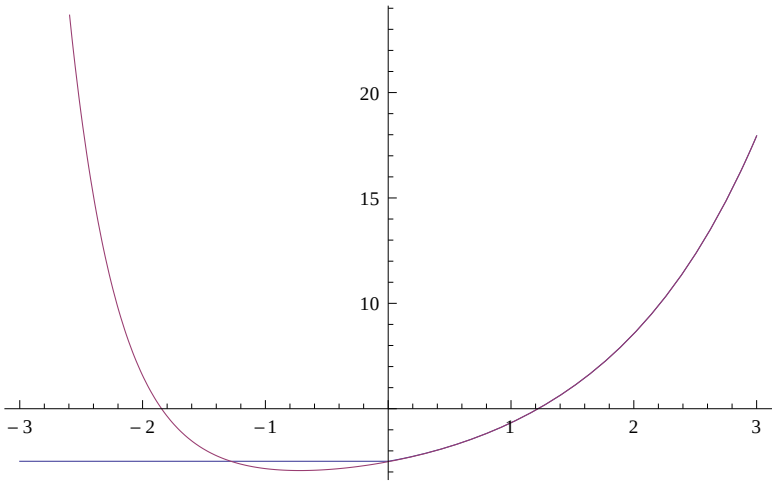
```
$Assumptions = k ≥ 0 && b > 0;
```

```
ost =.; mpr =.
```

```
D[f[a, w, b], a]
```

$$e^{-a\left(-1+e^{\left(-\frac{1}{2}+\text{mpr}\right)\text{ost}^2+\text{ost}\,w-b\,w^2}\right)-\frac{w^2}{2}}\left(1-e^{\left(-\frac{1}{2}+\text{mpr}\right)\text{ost}^2+\text{ost}\,w-b\,w^2}\right)$$

```
f[a_, w_, b_] := Exp[-a (e^(mpr -1/2) ost^2 + ost w-b w^2 - 1) - w^2 / 2]
df[a_, w_, b_] := e^(-a (-1+e^(-1/2+mpr) ost^2 + ost w - b w^2) - w^2/2) (1 - e^(-1/2+mpr) ost^2+ost w-b w^2)
g[a_, b_] := NIntegrate[f[a, w, 0], {w, -∞, b}]
dg[a_, b_] := NIntegrate[df[a, w, 0], {w, -∞, b}]
b = 2.4; o = -3; p = 3; Plot[{g[Max[0, a], ∞], g[a, b]}, {a, o, p}]
```



```
b = 30; o = -3; p = 3;
Plot[{g[Max[0, a], 0], dg[Max[0, a], 0], g[a, b], dg[a, b]}, {a, o, p}]
```

NIntegrate::inumri :

The integrand $e^{2.99988\ (-1+e^{-1.+w})-\frac{w^2}{2}}$ has evaluated to Overflow, Indeterminate, or Infinity for all sampling points in the region with boundaries {{29., 30.}}. >>

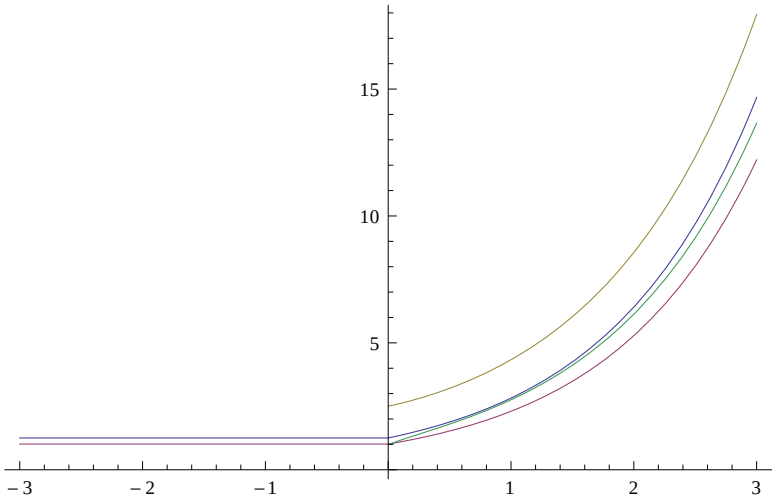
NIntegrate::inumri :

The integrand $e^{2.99988\ (-1+e^{-1.+w})-\frac{w^2}{2}}$ has evaluated to Overflow, Indeterminate, or Infinity for all sampling points in the region with boundaries {{29., 30.}}. >>

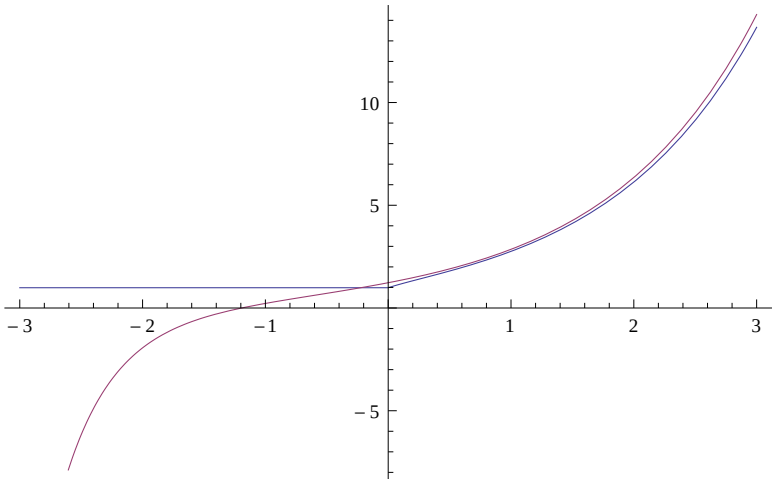
NIntegrate::inumri :

The integrand $e^{2.87743\ (-1+e^{-1.+w})-\frac{w^2}{2}}$ has evaluated to Overflow, Indeterminate, or Infinity for all sampling points in the region with boundaries {{29., 30.}}. >>

General::stop : Further output of NIntegrate::inumri will be suppressed during this calculation. >>

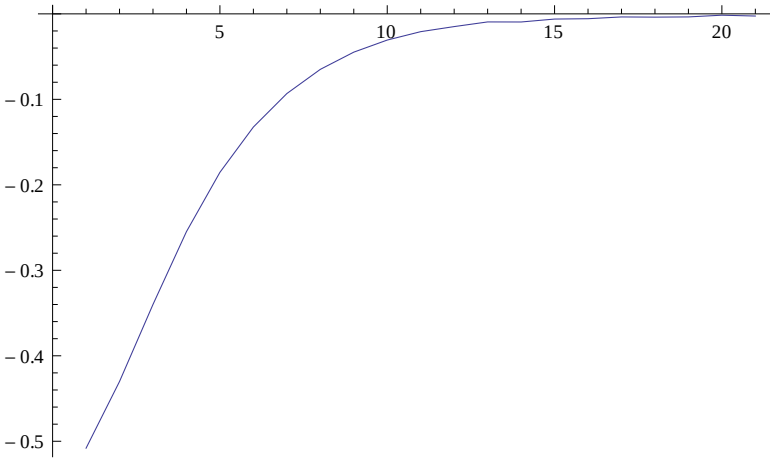



```
b = .1; o = -3; p = 3; Plot[{dg[Max[0, a], 0], dg[a, b]}, {a, o, p}]
```




```
h[b_] := Quiet[FindRoot[dg[a, b] == 0, {a, -5, 5}][[1, 2]]]
```

```
ListLinePlot[Table[h[1 / n / 2], {n, 10, 30}]]
```




```
fcs = Quiet[Table[fc2[n], {n, 650}]];
```

```
ListLinePlot[
 Transpose[Table[{Abs[fcs[[n]]]^(1/n), Abs[fcs[[n + 1]] / fcs[[n]]]}, {n, 1, 600}]]]
```