```
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 - #] &;
```

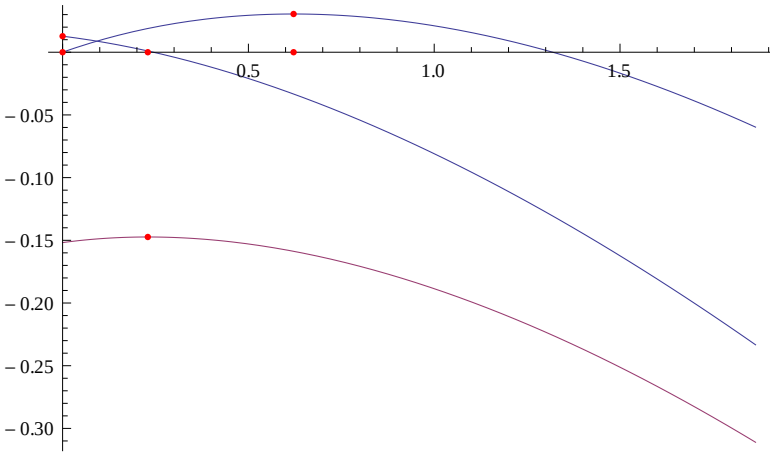
$$-6.54587 \times 10^{-13}$$

```
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]}]}]
  ]]
```

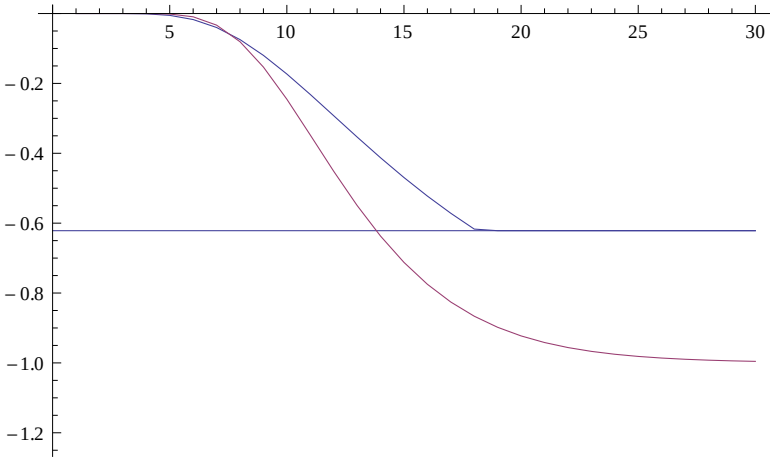
0.621583

```
plot[{0, 2, 8}]
```



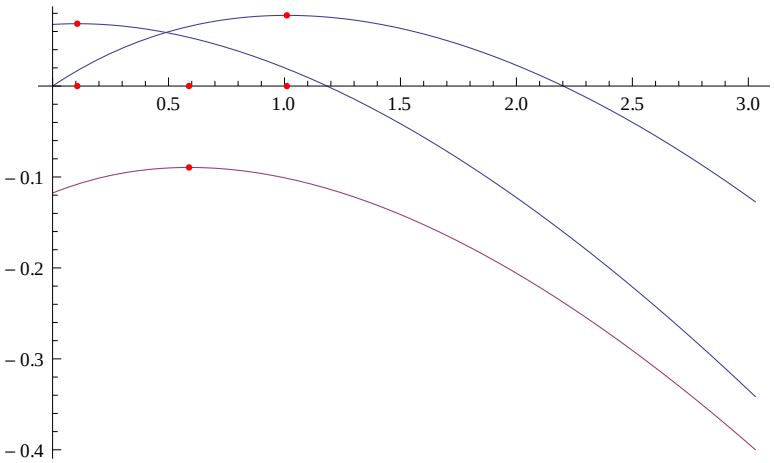

```
ds = Parallelize[Table[{k^2, Quiet[hedge[k^2]]}, {k, 0, Sqrt[20], Sqrt[20] / 40 // N}]];

Show[Plot[-arb, {x, 0, 30}],
 ListLinePlot[Transpose[{#[[2]] - arb, Δ[#[[1]]]} & /@ ds[[ ;; 30]]], PlotRange → All]]
```



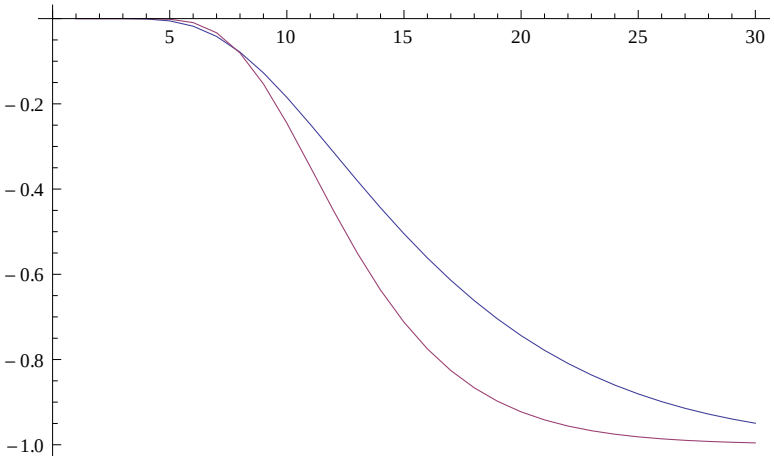

```
γ = .1; mpr = 0.158; ost = 1;

plot[{0, 2, 8}]
```



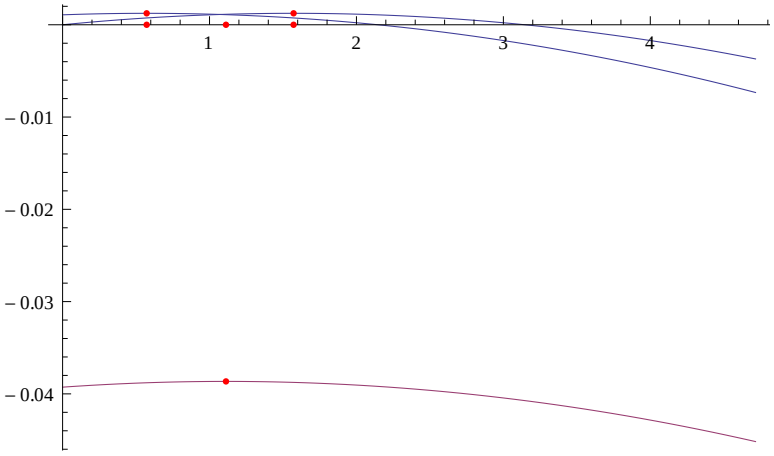
```
ds = Parallelize[Table[{k^2, Quiet[hedge[k^2]]}, {k, 0, Sqrt[20], Sqrt[20] / 40 // N}]];
```

```
Show[(*Plot[-arb 0,{x,0,30}],*)
  ListLinePlot[Transpose[{#[[2]] - arb, Δ[#[[1]]]} & /@ ds[[ ;; 30]]], PlotRange → All]]
```



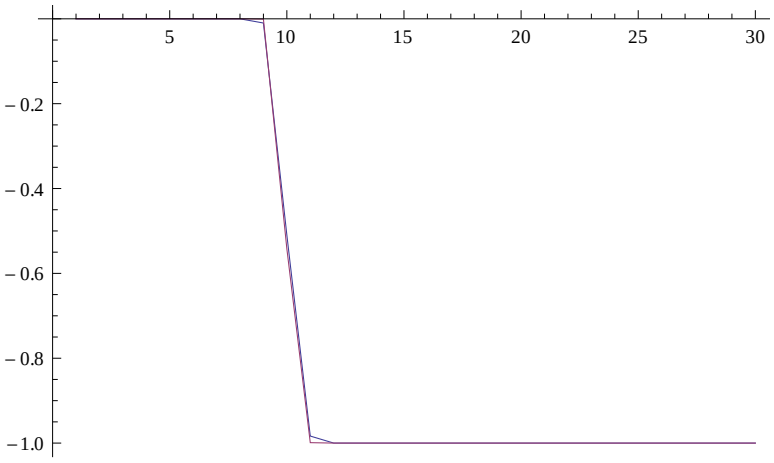

```
γ = .1; mpr = 0.158; ost = .1;
```

```
plot[{0, 1, 1.5}]
```




```
ds =
  Parallelize[Table[{k^2, Quiet[hedge[k^2]] - arb}, {k, 0, Sqrt[20], Sqrt[20] / 40 // N}]];
```

```
Show[(*Plot[-arb 0,{x,0,30}],*)
 ListLinePlot[Transpose[{#[[2]], Δ[#[[1]]]} & /@ ds[[ ;; 30]]], PlotRange → All]]
```




```
Plot[Δ[k], {k, 0, 1.5}]
```