```
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;
u[W_] := Exp[-γ W]
pr[B_] := e^(-B^2/2) / Sqrt[2 π]
σ2t = .2^2 .5; xx[B_] := Exp[ Sqrt[σ2t] B - σ2t / 2];
NIntegrate[xx[B] pr[B], {B, -∞, ∞}] - 1
σ2t =.;
c[x_] := If[x == 0, 0, .001] + Abs[x] .00025
```

-5.0826×10^{-13}

```
g[0, h_, P_] := Max[P, 0] + c[h]
g[n_, h_, P_] := Table[
f[n_, h_, P_, ψ_, ϕ_] := ex[n, P, ψ, ϕ] + c[h - ψ]


ex[n_, P_, ψ_, ϕ_] := ex[n, P, ψ, ϕ] =
```

Old shit

Short put

```
γ = .01; μ = 0; t = 1; k = 550; S0 = 600; σ = .25;
put[W_] := Max[0, k - W]
FinancialDerivative[{"European", "Put"}, {"StrikePrice" → k, "Expiration" → t},
 {"InterestRate" → 0.0, "Volatility" → σ, "CurrentPrice" → S0, "Dividend" → 0}]
p = NIntegrate[put[xx[B]] pr[B], {B, -∞, ∞}]

q = Log[NIntegrate[u[-put[xx[B]]] pr[B], {B, -∞, ∞}]] / γ
```

35.6083

35.6083

58.5032

Revision

```
γ = .01; k = 550; S0 = 600; σSqrtT = .25;

p0 = FinancialDerivative[{"European", "Put"}, {"StrikePrice" → k, "Expiration" → 1},
   {"InterestRate" → 0, "Volatility" → σSqrtT, "CurrentPrice" → S0}];

density[B_] := e^(-B^2/2) / Sqrt[2 π]

put[B_] := Max[0, k - S0 Exp[σSqrtT B - σSqrtT^2 / 2]]
p1 = NIntegrate[put[B] density[B], {B, -∞, ∞}];
p2 = 1 / γ Log[NIntegrate[Exp[γ put[B]] density[B], {B, -∞, ∞}]];
{p0, p1, p2}
```

```
{35.6083, 35.6083, 58.5032}
```

Marginal utility-based price

```
μT = -0.08;
put[B_] := Max[0, k - S0 Exp[σSqrtT B + μT - σSqrtT^2 / 2]]
pP = NIntegrate[put[B] density[B], {B, -∞, ∞}]

pP0 = FinancialDerivative[{"European", "Put"}, {"StrikePrice" → k, "Expiration" → 1},
  {"InterestRate" → 0, "Dividend" → -μT, "Volatility" → σSqrtT, "CurrentPrice" → S0}]
g[v_] := -1/γ Log[NIntegrate[Exp[-γ v put[B]] density[B], {B, -∞, ∞}]];
```

```
52.9911
```

```
52.9911
```

```
Plot[{g[v] / v - pP}, {v, -2, 10}]
```