

$$\mu = \{0.06, 0.08, 0.11\};$$

$$e = \{1, 1, 1\};$$

$$V = \{\{0.0025, -0.002, 0.003\}, \{-0.002, 0.01, 0.0\}, \{0.003, 0.01, 0.04\}\}$$

MatrixForm[V]

$$\begin{pmatrix} 0.0025 & -0.002 & 0.003 \\ -0.002 & 0.01 & 0.01 \\ 0.003 & 0.01 & 0.04 \end{pmatrix}$$

MatrixForm[vInvers = Inverse[V]]

$$\begin{pmatrix} 789.474 & 289.474 & -131.579 \\ 289.474 & 239.474 & -81.5789 \\ -131.579 & -81.5789 & 55.2632 \end{pmatrix}$$

(* Vektor for den absolutt variansminimerende

$$xMin = \frac{vInvers.e}{e.vInvers.e}$$

General::spell1 :

Possible spelling error: new symbol name "xM

{0.765957, 0.361702, -0.12766}

(* Vektor for "korreksjons-portefølje" for t
forventet avkastning *)

$$zStar = vInvers. \left(\mu - \frac{e.vInvers.\mu}{e.vInvers.e} e \right)$$

{-1.59574, 0.329787, 1.26596}

```
eRxMin = xMin.μ
```

```
0.0608511
```

```
eRzStar = zStar.μ
```

```
0.0698936
```

```
varxMin =  $\frac{1}{e.vInvers.e}$ 
```

```
testvarxMin = xMin.V.xMin
```

```
0.000808511
```

```
0.000808511
```

```
(* Her er selve uttrykket for vektene i den e
```

```
effWeights[r_] := xMin +  $\frac{(r - eRxMin) zStar}{eRzStar}$  ;
```

```
(* Tester at forventet avkastning i den effis  
forventet avkastning *)
```

```
testExStar = Simplify[  $\left( xMin + \frac{(r - eRxMin) zStar}{eRzStar} \right)$ 
```

```
0. + 1. r
```

```
varzStar = zStar.V.zStar
```

```
0.0698936
```

$$\text{varxStar}[r_] = \text{varxMin} + \left(\frac{r - eR\text{xMin}}{eR\text{zStar}} \right)^2 \text{varzStar}$$

General::spell1 : Possible spelling error: ne
symbol name "varxStar" is similar to exist

$$0.000808511 + 14.3075 (-0.0608511 + r)^2$$

(* Tester uttrykk for variansen til xStar*)

$$\text{Expand}\left[\text{varxMin} + \left(\frac{r - eR\text{xMin}}{eR\text{zStar}} \right)^2 \text{varzStar}\right]$$

$$0.0537869 - 1.74125 r + 14.3075 r^2$$

(* Sammenligner med variansen til den effisi

$$\text{Expand}\left[\left(\text{xMin} + \frac{(r - eR\text{xMin}) \text{zStar}}{eR\text{zStar}}\right) \cdot \text{V} \cdot \left(\text{xMin} + \frac{(r - eR\text{xMin}) \text{zStar}}{eR\text{zStar}}\right)\right]$$

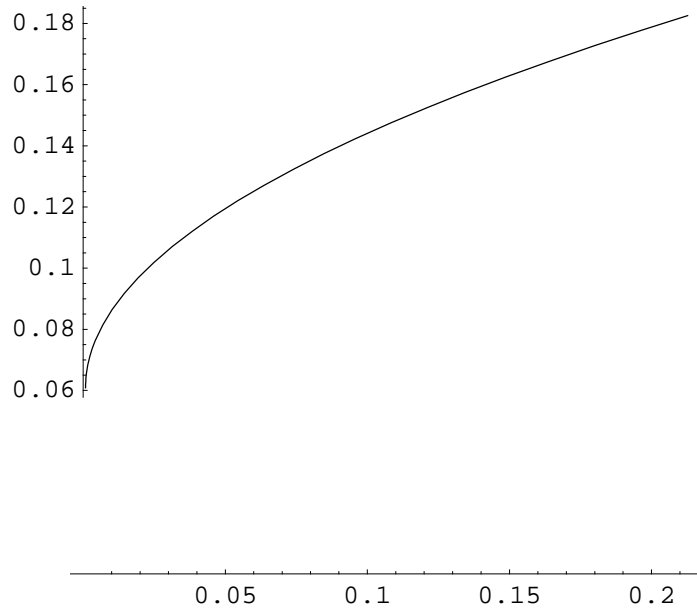
$$0.0537869 - 1.74125 r + 14.3075 r^2$$

(* Tester xMin og zStar ukorrolerte *)

$$\text{xMin} \cdot \text{V} \cdot \text{zStar}$$

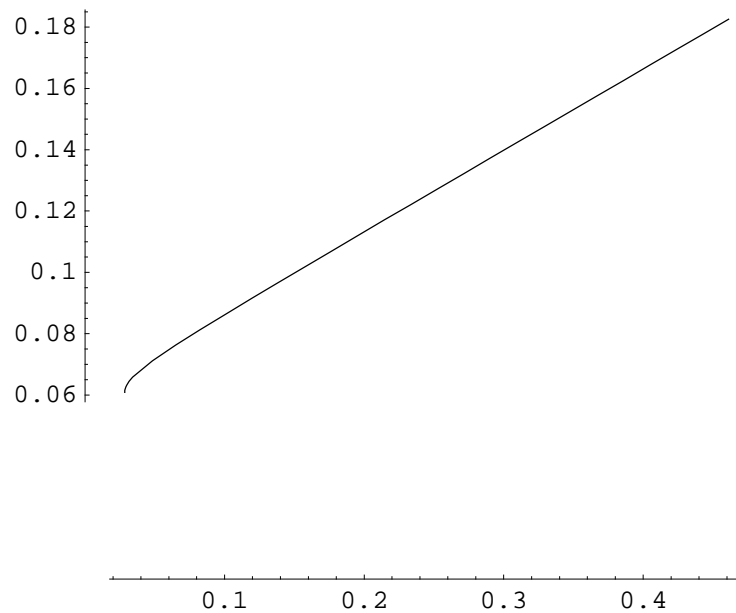
$$1.04626 \times 10^{-17}$$

```
ParametricPlot[{varxStar[r], r}, {r, eRxMin, 30}
```

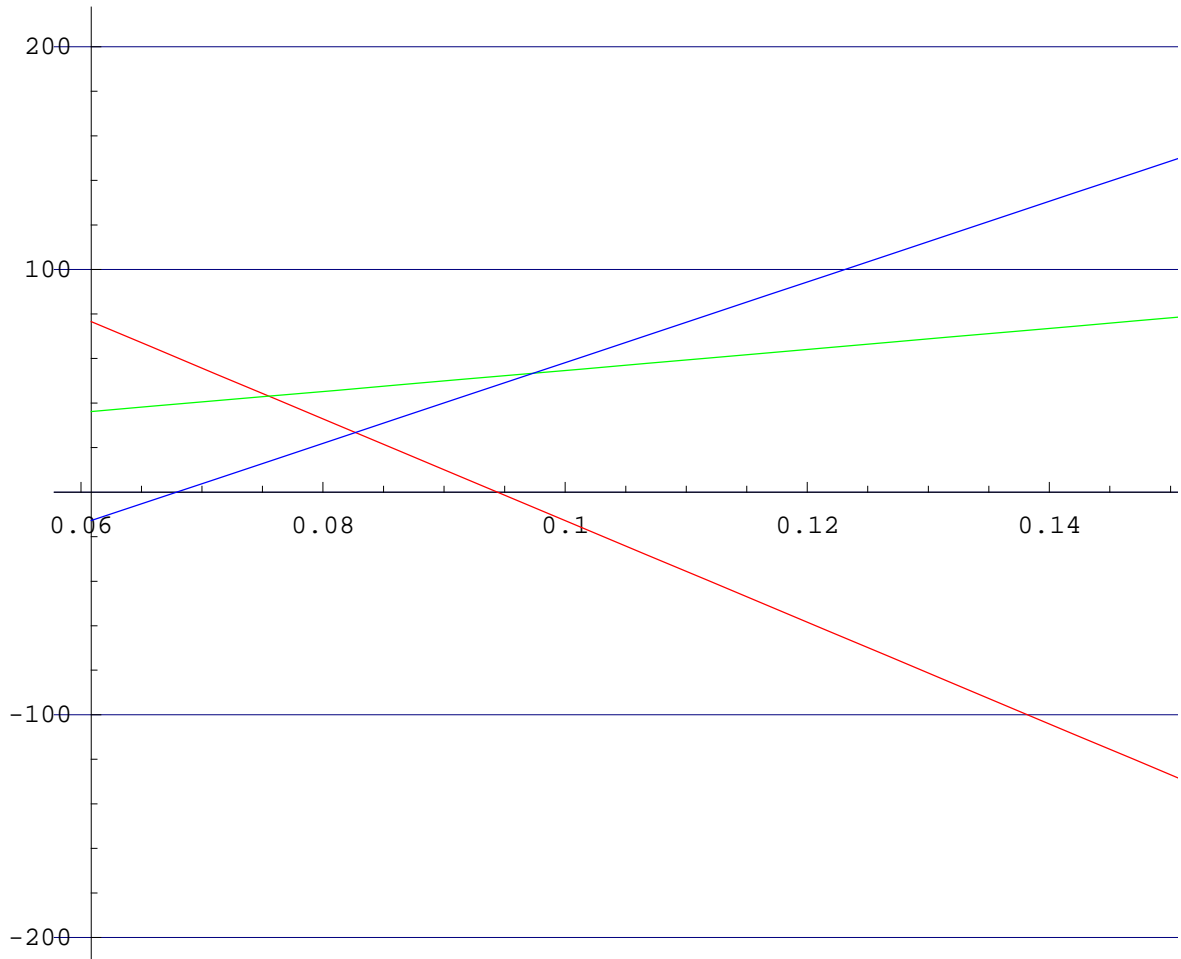


(* Her er selve porteføljefronten vist med st

```
ParametricPlot[{ $\sqrt{\text{varxStar}[r]}$ , r}, {r, eRxMin,
```



```
effPlots = Table[Plot[100 * effWeights[r][[n]], {r  
  AxesOrigin -> {eRxMin, 0}, DisplayFunction ->  
  PlotStyle -> {RGBColor[If[n == 1, 1, 0], If[n :  
Show[effPlots[[1]], effPlots[[2]], effPlots[[3]], Dis  
  GridLines -> {None, Automatic}, ImageSize -> 600
```



(* Av spesiell interesse er "mulighetsområdet
skjer dette der kravet til forventet avkast:
79 % til 9,44%*)

effWeights[.0679]

effWeights[.0944]

{0.605023, 0.394962, 0.0000152207}

{ 1.4988×10^{-14} , 0.52, 0.48}