$$N1(\alpha) := 4(\pi)^{\left(\frac{1}{2\alpha}-2\right)}\left(\frac{\Gamma(\alpha)\,\alpha}{\Gamma\left(\frac{1}{2}+\alpha\right)}\right)^{\frac{1}{\alpha}}$$

$$M(\rho) := 1.2(.5 + .5\ln(4\cdot\rho))$$

===

Xc, Qc and Yc SECTION

$x_0 := 10 \qquad y_0 := 1 \qquad x_e := 20$

Given

$$y'(x) = \frac{\alpha\cdot\left[2\cdot M(\rho) - 1 - \ln\left[4\cdot\rho\cdot N1(\alpha)\cdot y(x)\cdot\left(\frac{2}{\pi}\sqrt{\frac{2\,y(x)}{x}}\right)^{\frac{1}{\alpha}-2}\right]\right]}{N1(\alpha)\cdot\left(\frac{2}{\pi}\sqrt{\frac{2\cdot y(x)}{x}}\right)^{\frac{1-2\cdot\alpha}{\alpha}}} + (1-2\alpha)\frac{y(x)}{x}$$

$$y(x_0) = y_0$$

$$y\_(\alpha,\rho) := \text{Odesolve}(x, x_e)$$

$$y(\alpha,\rho,x) := \begin{array}{|l} tmp \leftarrow y\_(\alpha,\rho) \\ \text{return } tmp(x) \end{array}$$

$$F(\alpha,\rho,x) := \frac{\alpha\cdot\left[2\cdot M(\rho) - 1 - \ln\left[4\cdot\rho\cdot N1(\alpha)\cdot y(\alpha,\rho,x)\cdot\left(\frac{2}{\pi}\sqrt{\frac{2\,y(\alpha,\rho,x)}{x}}\right)^{\frac{1}{\alpha}-2}\right]\right]}{N1(\alpha)\cdot\left(\frac{2}{\pi}\sqrt{\frac{2\cdot y(\alpha,\rho,x)}{x}}\right)^{\frac{1}{\alpha}-2}} + (1-2\alpha)\frac{y(\alpha,\rho,x)}{x}$$

$y1 := y\_(0.50, 2)$

$y2 := y\_(0.45, 2)$

$y3 := y\_(0.40, 2)$

$F1(x) := F(0.50, 2, x)$

$F2(x) := F(0.45, 2, x)$

$F3(x) := F(0.40, 2, x)$

Defining these functions (y1,2,3) that way is MUCH quicker in evaluation than doing it that way: $y1(x) := y(0.50, 2, x)$ because the solveblock would be evaluated for every call to y1. Unfortunately it seems that the subsequent functions which all dependend on y have to be defined the hard way to be more general in respect to α and ρ.

Even worse, every call to F would call y four times and therefore the solve block is evaluated four times, too. You can avoid this if you define F a little bit different. See below:

$$F(\alpha,\rho,x) := \left| \begin{array}{l} tmp \leftarrow y(\alpha,\rho,x) \\ \text{return } \dfrac{\alpha\cdot\left[2\cdot M(\rho) - 1 - \ln\left[4\cdot\rho\cdot N1(\alpha)\cdot tmp\cdot\left(\frac{2}{\pi}\sqrt{\frac{2tmp}{x}}\right)^{\left(\frac{1}{\alpha}-2\right)}\right]\right]}{N1(\alpha)\cdot\left(\frac{2}{\pi}\sqrt{\frac{2\cdot tmp}{x}}\right)^{\frac{1-2\cdot\alpha}{\alpha}}} + (1-2\alpha)\dfrac{tmp}{x} \end{array} \right.$$

$F1(x) := F(0.50, 2, x)$

These definitions should work a little bit quicker

$F2(x) := F(0.45, 2, x)$

$F3(x) := F(0.40, 2, x)$

$$Fapp(\alpha,\rho,x) := \frac{y(\alpha,\rho,x)}{x}$$

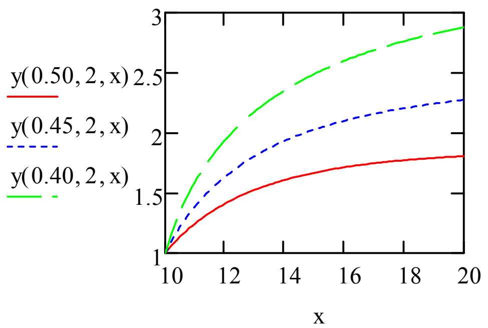
$F1app(x) := Fapp(0.50, 2, x)$ $F2app(x) := Fapp(0.45, 2, x)$ $F3app(x) := Fapp(0.40, 2, x)$

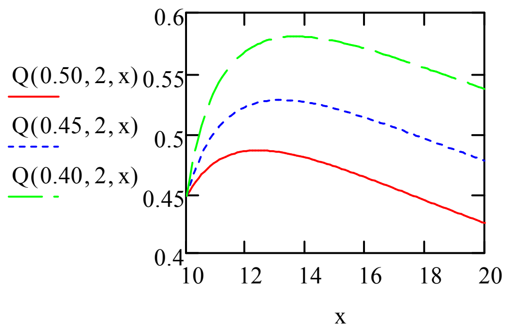
$$Q(\alpha,\rho,x) := \left(2\,\frac{y(\alpha,\rho,x)}{x}\right)^{0.5}$$

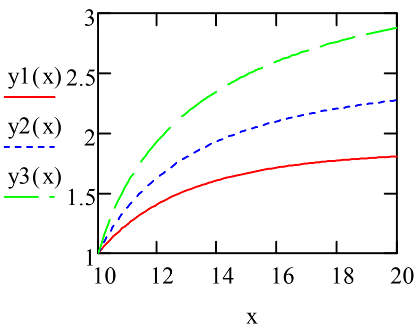
$Q1(x) := Q(0.5, 2, x)$ $Q2(x) := Q(0.45, 2, x)$ $Q3(x) := Q(0.4, 2, x)$

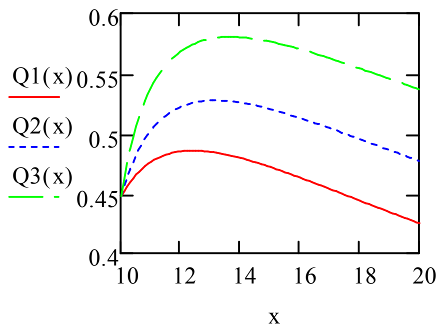
$x := x_0, x_0 + 0.1 .. x_e$

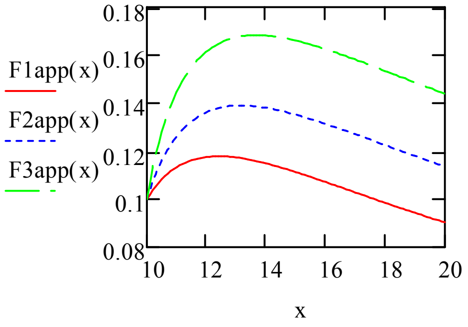
You need not define those function y1, y2,..F1, F2, Q1, etc.
You could use the more general functions directly, of course.
I'll do it for the first two to show.

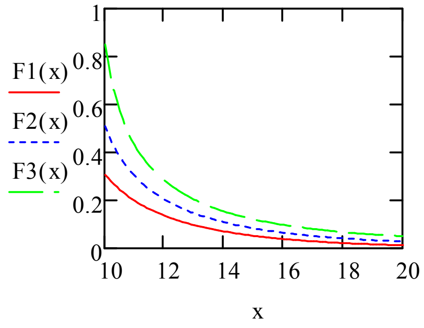


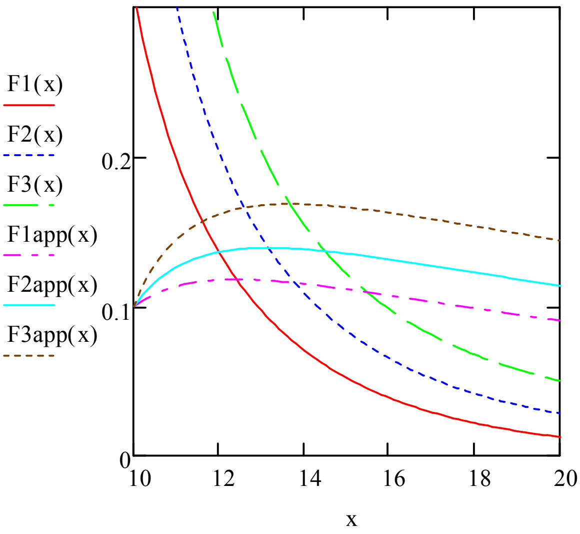


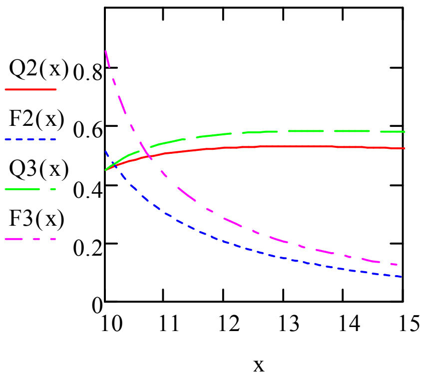












$S(\alpha,\rho,x) := F(\alpha,\rho,x) - Fapp(\alpha,\rho,x)$

$xc(\alpha,\rho) := root\left(S(\alpha,\rho,x),x,x_0,x_e\right)$

$Qc(\alpha,\rho) := Q(\alpha,\rho,xc(\alpha,\rho))$

$yc(\alpha,\rho) := y(\alpha,\rho,xc(\alpha,\rho))$

$x1c := xc(0.50,2) = 12.407$	$x2c := xc(0.45,2) = 13.152$	$x3c := xc(0.40,2) = 13.665$
$Q1c := Qc(0.50,2) = 0.486$	$Q2c := Qc(0.45,2) = 0.527$	$Q1c := Qc(0.40,2) = 0.58$
$y1c := yc(0.50,2) = 1.462$	$y2c := yc(0.45,2) = 1.829$	$y1c := yc(0.40,2) = 2.301$

$\alpha := \text{stack}(0.50, 0.45, 0.40)$ $\rho := \text{stack}(2, 5, 10, 20, 30, 50, 60)$

$\text{row} := 0 .. \text{last}(\alpha)$ $\text{col} := 0 .. \text{last}(\rho)$

Step by step construction of xc-table

$\text{xc\_table}_{\text{row},\text{col}} := \text{xc}\left(\alpha_{\text{row}}, \rho_{\text{col}}\right)$

$$\text{xc\_table} = \begin{pmatrix} 12.407 & 13.109 & 13.605 & 14.086 & 14.365 & 14.716 & 14.842 \\ 13.152 & 13.716 & 14.14 & 14.568 & 14.822 & 15.145 & 15.261 \\ 13.665 & 14.159 & 14.544 & 14.941 & 15.179 & 15.485 & 15.596 \end{pmatrix}$$

Formatted as table without labels:

xc_table =

12.407	13.109	13.605	14.086	14.365	14.716	14.842
13.152	13.716	14.14	14.568	14.822	15.145	15.261
13.665	14.159	14.544	14.941	15.179	15.485	15.596

$\text{xc\_table} := \text{stack}\left(\rho^{T}, \text{xc\_table}\right)$

$$\text{xc\_table} = \begin{pmatrix} 2 & 5 & 10 & 20 & 30 & 50 & 60 \\ 12.407 & 13.109 & 13.605 & 14.086 & 14.365 & 14.716 & 14.842 \\ 13.152 & 13.716 & 14.14 & 14.568 & 14.822 & 15.145 & 15.261 \\ 13.665 & 14.159 & 14.544 & 14.941 & 15.179 & 15.485 & 15.596 \end{pmatrix}$$

$\text{xc\_table} := \text{augment}(\text{stack}(\text{"}\alpha\backslash\rho\text{"}, \alpha), \text{xc\_table})$

xc_table =

"α\ρ"	2	5	10	20	30	50	60
0.5	12.407	13.109	13.605	14.086	14.365	14.716	14.842
0.45	13.152	13.716	14.14	14.568	14.822	15.145	15.261
0.4	13.665	14.159	14.544	14.941	15.179	15.485	15.596

Make it more versatile via a function to build the table:

$$
\text{Table}(f,\alpha v,\rho v) := \left|
\begin{array}{l}
M \leftarrow 0 \\
\text{for } r \in 0..\text{last}(\alpha v) \\
\quad \text{for } c \in 0..\text{last}(\rho v) \\
\quad\quad M_{r,c} \leftarrow f\left(\alpha v_r, \rho v_c\right) \\
M \leftarrow \text{augment}\left(\text{stack}("\alpha\backslash\rho", \alpha v), \text{stack}\left(\rho v^T, M\right)\right)
\end{array}
\right.
$$

Table(xc, α, ρ) =

"α\ρ"	2	5	10	20	30	50	60
0.5	12.407	13.109	13.605	14.086	14.365	14.716	14.842
0.45	13.152	13.716	14.14	14.568	14.822	15.145	15.261
0.4	13.665	14.159	14.544	14.941	15.179	15.485	15.596

Table(Qc, α, ρ) =

"α\ρ"	2	5	10	20	30	50	60
0.5	0.486	0.511	0.532	0.554	0.567	0.584	0.59
0.45	0.527	0.555	0.577	0.599	0.613	0.63	0.636
0.4	0.58	0.609	0.631	0.653	0.666	0.683	0.689

Table(yc, α, ρ) =

"α\ρ"	2	5	10	20	30	50	60
0.5	1.462	1.712	1.925	2.159	2.308	2.507	2.581
0.45	1.829	2.113	2.353	2.616	2.781	3.002	3.084
0.4	2.301	2.624	2.894	3.188	3.371	3.615	3.706

Or use the table-function like this (you can create the vectors differently, but I prefer using stack):

Table(xc, stack(0.55, 0.48, 0.42, 0.37, 0.35), stack(1.5, 2.5, 8, 15, 40, 50, 70)) =

"α\ρ"	1.5	2.5	8	15	40	50	70
0.55	10.938	11.578	12.722	13.253	14.027	14.198	14.454
0.48	12.528	12.898	13.688	14.103	14.75	14.898	15.123
0.42	13.322	13.608	14.269	14.634	15.222	15.359	15.569
0.37	13.745	14.001	14.609	14.954	15.515	15.647	15.849
0.35	13.868	14.118	14.714	15.053	15.608	15.739	15.939