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> #NOT Okay to post
> #Anusha Nagar, Homework 15, 10.25.2021
>
> #Problem 2
> #First Diff. Eq.
> dsolve( {D(x)(t) - (5 - x(t))·(2 - x(t))·(3 - x(t)), x(0) = 7/2}, x(t) )
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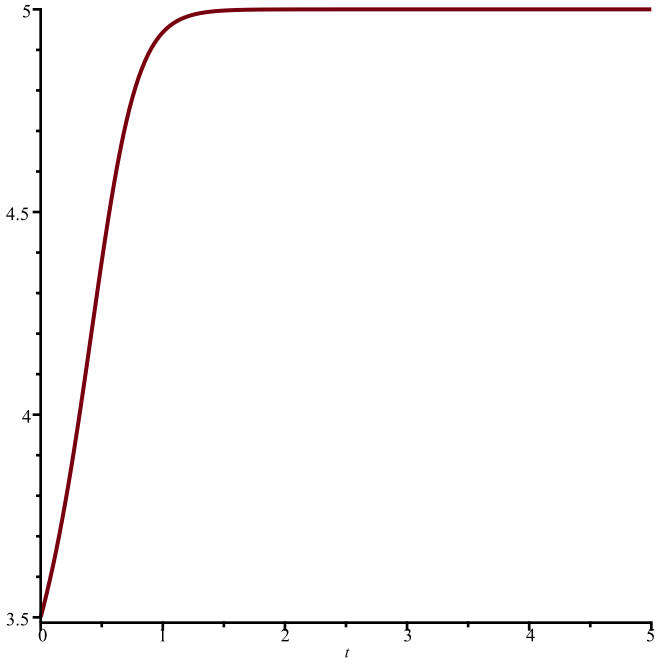
$$x(t) = -\frac{\left(-\frac{(e^t)^6\left(\sqrt{-\frac{1}{-\frac{(e^t)^6}{27}-1}}+1\right)\left(-\frac{(e^t)^6}{27}-1\right)^2}{27}\right)^{1/3}}{2\left(-\frac{(e^t)^6}{27}-1\right)} + \frac{(e^t)^6}{54\left(-\frac{(e^t)^6\left(\sqrt{-\frac{1}{-\frac{(e^t)^6}{27}-1}}+1\right)\left(-\frac{(e^t)^6}{27}-1\right)^2}{27}\right)^{1/3}} + 3 + \frac{1}{2}\left(I\sqrt{3}\left(\frac{\left(-\frac{(e^t)^6\left(\sqrt{-\frac{1}{-\frac{(e^t)^6}{27}-1}}+1\right)\left(-\frac{(e^t)^6}{27}-1\right)^2}{27}\right)^{1/3}}{-\frac{(e^t)^6}{27}-1} + \frac{(e^t)^6}{27\left(-\frac{(e^t)^6\left(\sqrt{-\frac{1}{-\frac{(e^t)^6}{27}-1}}+1\right)\left(-\frac{(e^t)^6}{27}-1\right)^2}{27}\right)^{1/3}}\right)\right) \quad \textbf{(1)}$$

$$> \mathit{plot}\left(-\frac{\left(-\frac{\left(e^t\right)^6\left(\sqrt{-\frac{1}{-\frac{\left(e^t\right)^6}{27}-1}}+1\right)\left(-\frac{\left(e^t\right)^6}{27}-1\right)^2}{27}\right)^{1/3}}{2\left(-\frac{\left(e^t\right)^6}{27}-1\right)} + \frac{\left(e^t\right)^6}{54\left(-\frac{\left(e^t\right)^6\left(\sqrt{-\frac{1}{-\frac{\left(e^t\right)^6}{27}-1}}+1\right)\left(-\frac{\left(e^t\right)^6}{27}-1\right)^2}{27}\right)^{1/3}} + 3 + \frac{1}{2}\left(\mathrm{I}\sqrt{3}\left(\frac{\left(-\frac{\left(e^t\right)^6\left(\sqrt{-\frac{1}{-\frac{\left(e^t\right)^6}{27}-1}}+1\right)\left(-\frac{\left(e^t\right)^6}{27}-1\right)^2}{27}\right)^{1/3}}{-\frac{\left(e^t\right)^6}{27}-1} \right. \right. \right.$$

$$+\frac{(e^t)^6}{27\left(-\frac{(e^t)^6\left(\sqrt{-\frac{1}{-\frac{(e^t)^6}{27}-1}}+1\right)\left(-\frac{(e^t)^6}{27}-1\right)^2}{27}\right)^{1/3}}\Bigg)\Bigg), t=0..5\Bigg)$$



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> *#Second diff eq.*

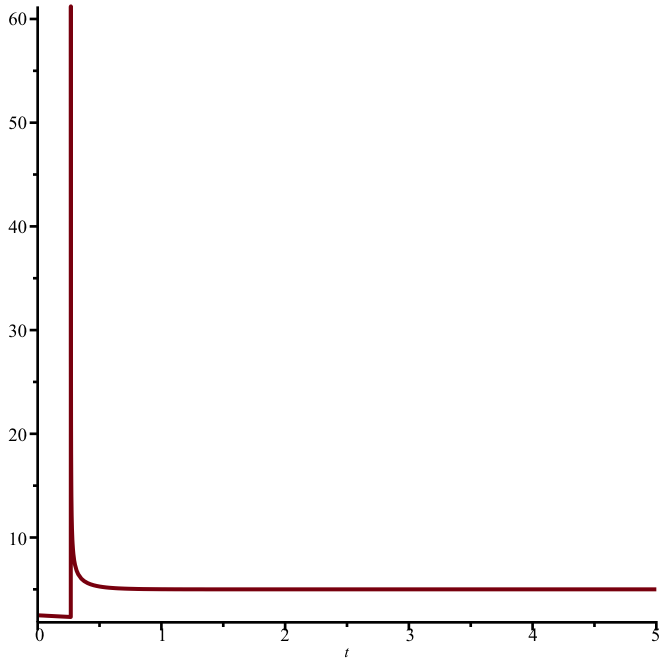
> $dsolve\left(\left\{D(x)(t)-(5-x(t))\cdot(2-x(t))\cdot(3-x(t)), x(0)=\frac{5}{2}\right\}, x(t)\right)$

$$x(t)=\frac{5^{2/3}\left((e^t)^6\left(\sqrt{-\frac{1}{\frac{(e^t)^6}{5}-1}}+1\right)\left(\frac{(e^t)^6}{5}-1\right)^2\right)^{1/3}}{5\left(\frac{(e^t)^6}{5}-1\right)} \quad \textbf{(2)}$$

$$+\frac{\left(e^{t}\right)^{6}5^{1/3}}{5\left(\left(e^{t}\right)^{6}\left(\sqrt{-\frac{1}{\frac{\left(e^{t}\right)^{6}}{5}-1}}+1\right)\left(\frac{\left(e^{t}\right)^{6}}{5}-1\right)^{2}\right)^{1/3}}+3$$

> $$plot\left(\frac{5^{2/3}\left(\left(e^{t}\right)^{6}\left(\sqrt{-\frac{1}{\frac{\left(e^{t}\right)^{6}}{5}-1}}+1\right)\left(\frac{\left(e^{t}\right)^{6}}{5}-1\right)^{2}\right)^{1/3}}{5\left(\frac{\left(e^{t}\right)^{6}}{5}-1\right)}\right.$$

$$\left.+\frac{\left(e^{t}\right)^{6}5^{1/3}}{5\left(\left(e^{t}\right)^{6}\left(\sqrt{-\frac{1}{\frac{\left(e^{t}\right)^{6}}{5}-1}}+1\right)\left(\frac{\left(e^{t}\right)^{6}}{5}-1\right)^{2}\right)^{1/3}}+3,\ t=0..5\right)$$



> **read** "C://Users/an646/Documents/M15.txt"

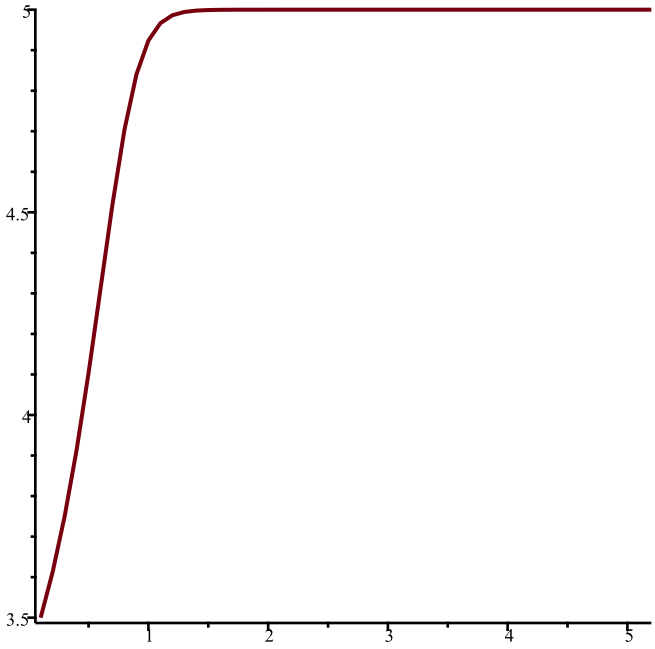
> *Help15( )*

HW3(u,v,w), HW2(u,v) , Dis1(F,y,y0,h,A), ToSys(k,z,f,INI) **(3)**

> $$Dis1\left((5-y(t))\cdot(2-y(t))\cdot(3-y(t)),y(t),\frac{7}{2},0.1,5\right)$$

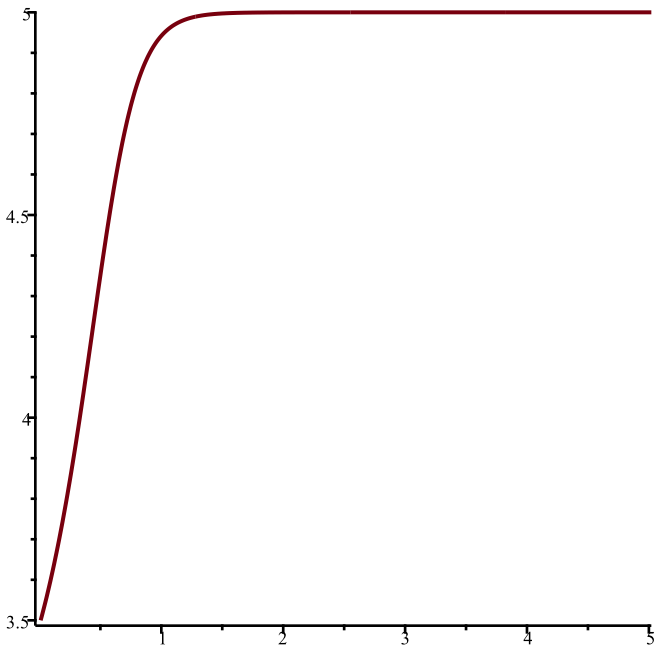
$$\left[\left[0.1, \frac{7}{2}\right], [0.2, 3.612500000], [0.3, 3.749537305], [0.4, 3.913515915], [0.5, 4.103436293], [0.6, 4.311529442], [0.7, 4.520248856], [0.8, 4.704060970], [0.9, 4.840426265], [1.0, 4.923844953], [1.1, 4.966682352], [1.2, 4.986121606], [1.3, 4.994352605], [1.4, 4.997725113], [1.5, 4.999087459], [1.6, 4.999634567], [1.7, 4.999853760], [1.8, 4.999941493], [1.9, 4.999976595], [2.0, 4.999990638], [2.1, 4.999996255], [2.2, 4.999998502], [2.3, 4.999999401], [2.4, 4.999999760], [2.5, 4.999999904], [2.6, 4.999999962], [2.7, 4.999999985], [2.8, 4.999999994], [2.9, 4.999999998], [3.0, 4.999999999], [3.1, 5.000000000], [3.2, 5.000000000], [3.3, 5.000000000], [3.4, 5.000000000], [3.5, 5.000000000], [3.6, 5.000000000], [3.7, 5.000000000], [3.8, 5.000000000], [3.9, 5.000000000], [4.0, 5.000000000], [4.1, 5.000000000], [4.2, 5.000000000], [4.3, 5.000000000], [4.4, 5.000000000], [4.5, 5.000000000], [4.6, 5.000000000], [4.7, 5.000000000], [4.8, 5.000000000], [4.9, 5.000000000], [5.0, 5.000000000], [5.1, 5.000000000], [5.2, 5.000000000]] \quad (4)$$

> *plot*(%)



> $Dis1\left((5-y(t))\cdot(2-y(t))\cdot(3-y(t)), y(t), \frac{7}{2}, 0.01, 5\right)$:

> *plot*(%)

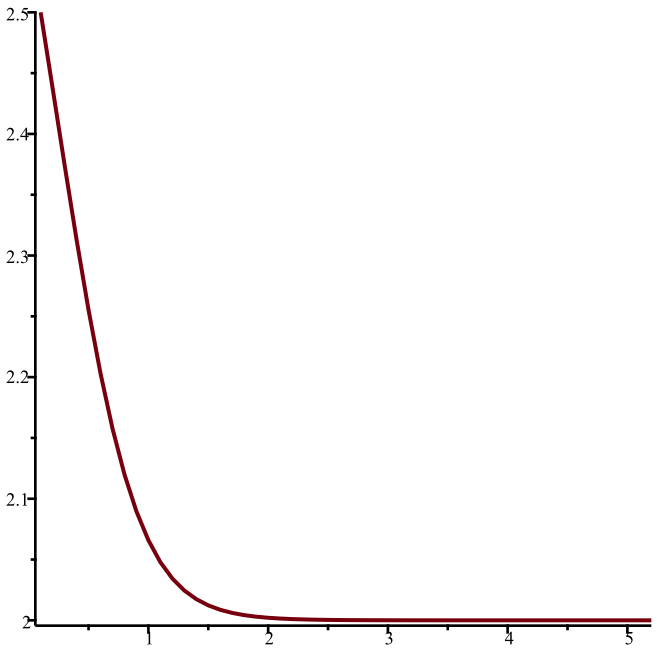


> #Second diff eq

> $Dis1\left((5-y(t))\cdot(2-y(t))\cdot(3-y(t)), y(t), \frac{5}{2}, 0.1, 5\right)$

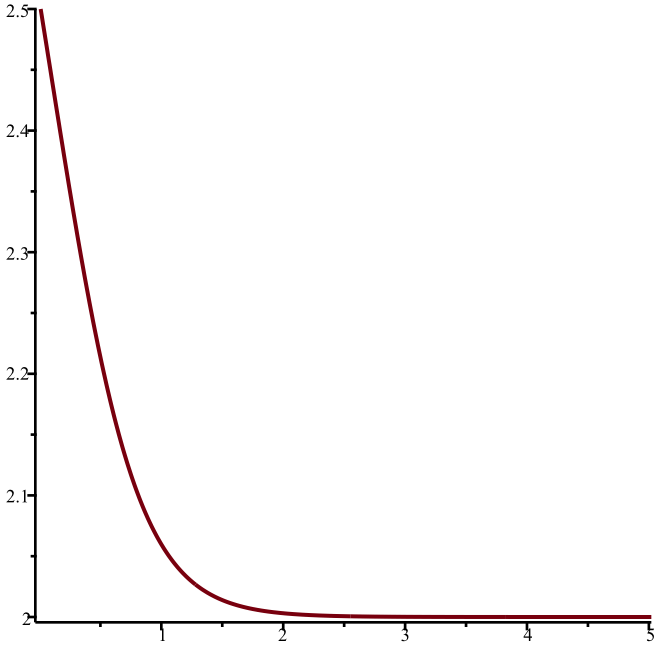
$$\left[\left[0.1, \frac{5}{2}\right], [0.2, 2.437500000], [0.3, 2.374438477], [0.4, 2.312938819], [0.5, 2.255164823], [0.6, 2.202997656], [0.7, 2.157745065], [0.8, 2.119982423], [0.9, 2.089573285], [1.0, 2.065838781], [1.1, 2.047792505], [1.2, 2.034357487], [1.3, 2.024518360], [1.4, 2.017401838], [1.5, 2.012301889], [1.6, 2.008671671], [1.7, 2.006100184], [1.8, 2.004284991], [1.9, 2.003006830], [2.0, 2.002108395], [2.1, 2.001477654], [2.2, 2.001035231], [2.3, 2.000725090], [2.4, 2.000507773], [2.5, 2.000355544], [2.6, 2.000248931], [2.7, 2.000174276], [2.8, 2.000122005], [2.9, 2.000085409], [3.0, 2.000059789], [3.1, 2.000041854], [3.2, 2.000029299], [3.3, 2.000020510], [3.4, 2.000014357], [3.5, 2.000010050], [3.6, 2.000007035], [3.7, 2.000004925], [3.8, 2.000003448], [3.9, 2.000002414], [4.0, 2.000001690], [4.1, 2.000001183], [4.2, 2.000000828], [4.3, 2.000000580], [4.4, 2.000000406], [4.5, 2.000000284], [4.6, 2.000000199], [4.7, 2.000000139], [4.8, 2.000000097], [4.9, 2.000000068], [5.0, 2.000000048], [5.1, 2.000000034], [5.2, 2.000000024]]$$ **(5)**

> $plot(\%)$



> $Dis1\left((5 - y(t)) \cdot (2 - y(t)) \cdot (3 - y(t)), y(t), \frac{5}{2}, 0.01, 5 \right) :$

> $plot(\%)$



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> #Problem 2

> $ToSys\left(4, z, \frac{(z[1] + 2 \cdot z[2] + 3 \cdot z[3] + 11 \cdot z[4])}{z[1] + z[3]}, [1, 5, 5, 2] \right)$

$$\left[\frac{z_1 + 2\,z_2 + 3\,z_3 + 11\,z_4}{z_1 + z_3}, z_1, z_2, z_3 \right], [1, 5, 5, 2]$$

(6)

> $SFP2\left(\frac{(z[1]+2\cdot z[2]+3\cdot z[3]+11\cdot z[4])}{z[1]+z[3]}, z[1], z[2], z[3], z[4]\right)$

$$\left[\left[\left(\frac{z_1+2\,z_2+3\,z_3+11\,z_4}{z_1+z_3}\right)_1, \left(\frac{z_1+2\,z_2+3\,z_3+11\,z_4}{z_1+z_3}\right)_2\right]\right] \quad (7)$$

> #Problem 3

> Help11( )

SFPe(f,x), Orbk(k,z,f,INI,K1,K2) (8)

> $Orbk(2, z, (1-z[1])\cdot(1-z[2]), [2.5, 2.7], 1000, 1010)$

[0.3819660113, 0.3819660113, 0.3819660112, 0.3819660113, 0.3819660113, 0.3819660112, 0.3819660113, 0.3819660113, 0.3819660112, 0.3819660113, 0.3819660113] (9)

> $ToSys(2, z, (1-z[1])\cdot(1-z[2]), [2.5, 2.7])$

$$[(1-z_1)\,(1-z_2), z_1], [2.5, 2.7] \quad (10)$$

> Help13( )

RT2(x,y,d,K), Orb2(F,x,y,pt0,K1,K2), FP2(F,x,y), SFP2(F,x,y), PlotOrb2(L), FP2drz(F,x,y), SFP2drz(F,x,y) (11)

> $SFP2((1-z[1])\cdot(1-z[2]), z[1], z[2])$

$$\left[\left[((1-z_1)\,(1-z_2))_1, ((1-z_1)\,(1-z_2))_2\right]\right] \quad (12)$$

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Anusha Nagar, Homework 15, 10/25/2021

(1) ✓

(2) RUID: 185007365
↳ 185227365

$$x'(t) = [a_3 - x(t)](a_4 - x(t))(a_7 - x(t)), \quad x(0) = \frac{a_3 + a_4}{2}$$

$$x'(t) = (a_3 - x(t))(a_4 - x(t))(a_7 - x(t)), \quad x(0) = \frac{a_4 + a_7}{2}$$

(2) $$x(n) = \frac{x(n-1) + 2x(n-2) + 3x(n-3) + 11x(n-4)}{x(n-1) + x(n-3)}$$

$$x(0) = 1, \; x(1) = 5, \; x(2) = 5, \; x(3) = 2$$

$$x_1(n) = \frac{x_1(n-1) + 2x_1(n-2) + 3x_1(n-3) + 11x_1(n-4)}{x_1(n-1) + x_1(n-3)}$$

$$x_2(n) = x_1(n-1)$$

$$x_1(n) = \frac{x_2(n) + 2x_2(n-1) + 3x_2(n-2) + 11x_2(n-3)}{x_2(n) + x_2(n-2)}$$

$$x_3(n) = x_2(n-1) = x_1(n-2) \quad \& \quad x_4(n) = x_3(n-1) = x_2(n-2) = x_1(n-3)$$

$$x_1(n) = \frac{x_2(n) + 2x_3(n) + 3x_4(n) + 11x_4(n-1)}{x_2(n) + x_4(n)}$$

$$x_1(0) = 1, \; x_1(1) = 5, \; x_1(2) = 5, \; x_1(3) = 2$$

$u = AA$, $v = Aa$, $w = aa$

(4)

Mother	Father	Frequency	OFFSPRING AA	OFFSPRING Aa	OFFSPRING aa
AA	AA	u^2	u^2	$\emptyset$	$\emptyset$
Aa	AA	uv	$\frac{1}{2}uv$	$\frac{1}{2}uv$	$\emptyset$
aa	AA	uw	$\emptyset$	uw	$\emptyset$
AA	Aa	uv	$\frac{1}{2}uv$	$\frac{1}{2}uv$	$\emptyset$
Aa	Aa	v^2	$\frac{1}{4}v^2$	$\frac{1}{2}v^2$	$\frac{1}{4}v^2$
aa	Aa	vw	$\emptyset$	$\frac{1}{2}vw$	$\frac{1}{2}vw$
AA	aa	uw	$\emptyset$	uw	$\emptyset$
Aa	aa	vw	$\emptyset$	$\frac{1}{2}vw$	$\frac{1}{2}vw$
aa	aa	w^2	$\emptyset$	$\emptyset$	w^2
Total:			$u^2+uv+\frac{1}{2}v^2$	$uv+2vw+vw+\frac{1}{2}v^2$	$w^2+vw+\frac{1}{2}v^2$

✓ ✓ ✓

Aligns w/ textbook