Assignment 4

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Variation 1

$$k = 0.5 \qquad h = 0.25 \qquad P_0 = 1$$

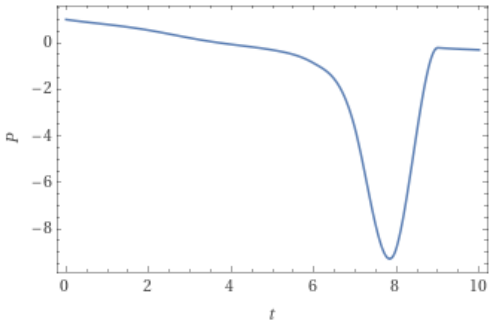
Runge-Kutta method, dP/dt = (0.5*cos(t))P(1-P)-0.25, P(0) = 1, from 1 to 10

NATURAL LANGUAGE | MATH INPUT | EXTENDED KEYBOARD | EXAMPLES | UPLOAD | RANDOM

Input interpretation

solve	$P'(t) =$ $-0.25 + 0.5\cos(t)$ $(1 - P(t))\,P(t)$ $P(0) = 1$	using fourth-order Runge-Kutta method	from $P = 1$ to 10

Solution plot



(using 10 steps with stepsize 1)

Stepwise results

step	t	P
0	0	1
1	2	0.540876
2	4	−0.0693319
3	6	−0.879444
4	8	−8.80498
5	10	−0.304635

Variation 2

$$k = 0.5 \qquad h = 0.5 \qquad P_0 = 1$$

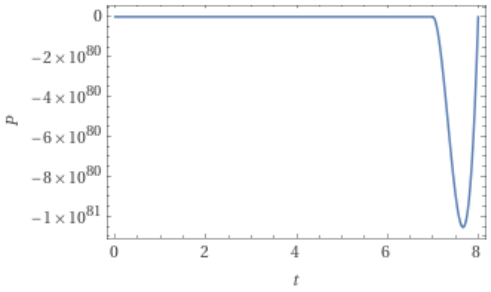
Runge-Kutta method, dP/dt = (0.5*cos(t))P(1-P)-0.5, P(0) = 1, from 1 to 10

NATURAL LANGUAGE | MATH INPUT | EXTENDED KEYBOARD | EXAMPLES | UPLOAD | RANDOM

Input interpretation

solve	$P'(t) =$ $-0.5 + 0.5\cos(t)$ $(1 - P(t))\,P(t)$ $P(0) = 1$	using fourth-order Runge-Kutta method	from $P = 1$ to 10

Solution plot



(using 10 steps with stepsize 1)

Stepwise results

step	t	P
0	0	1
1	2	0.076645
2	4	−0.549235
3	6	−3.52737
4	8	3.12908×10^{41}
5	10	$1.148842979065710\times10^{10342}$

Variation 3

$$k = 0.5 \qquad h = 0.25 \qquad P_0 = 2$$

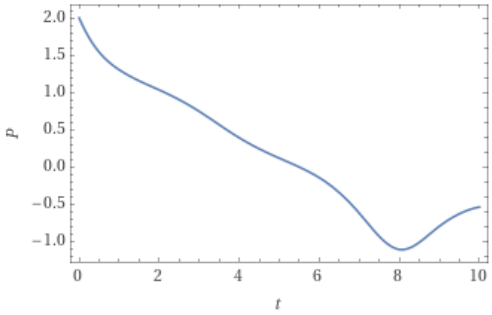
Runge-Kutta method, dP/dt = (0.5*cos(t))P(1-P)-0.25, P(0) = 2, from 1 to 10

NATURAL LANGUAGE | MATH INPUT | EXTENDED KEYBOARD | EXAMPLES | UPLOAD | RANDOM

Input interpretation

solve	$P'(t) =$ $-0.25 + 0.5\cos(t)$ $(1 - P(t))\,P(t)$ $P(0) = 2$	using fourth-order Runge-Kutta method	from $P = 1$ to 10

Solution plot



(using 10 steps with stepsize 1)

Stepwise results

step	t	P
0	0	2
1	2	1.03295
2	4	0.389661
3	6	−0.144854
4	8	−1.10966
5	10	−0.540028

Variation 4

$$k = 0.75 \qquad h = 0.25 \qquad P_0 = 1$$

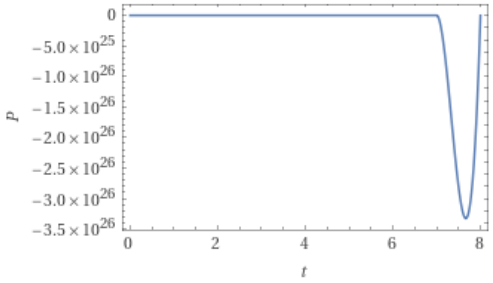
Runge-Kutta method, dP/dt = (0.75*cos(t))P(1-P)-0.25, P(0) = 1, from 1 to 10

NATURAL LANGUAGE | MATH INPUT | EXTENDED KEYBOARD | EXAMPLES | UPLOAD | RANDOM

Input interpretation

solve	$P'(t) =$ $-0.25 + 0.75\cos(t)$ $(1 - P(t))\,P(t)$ $P(0) = 1$	using fourth-order Runge-Kutta method	from $P = 1$ to 10

Solution plot



(using 10 steps with stepsize 1)

Stepwise results

step	t	P
0	0	1
1	2	0.557843
2	4	−0.0889237
3	6	−1.18959
4	8	1.43434×10^{14}
5	10	$1.736881753390299 \times 10^{3388}$