```
> #Hrudai Battini, 9-12-21, HW3 Ok to post.
> #1:
y2 := dsolve({D(D(y))(t) − y(t) = 0, y(0) = 1, D(y)(0) = 0}, numeric):
y2(1)[2];
y3 := dsolve({ D(D(D(y)))(t) − y(t) = 0, y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0},
    numeric):
y3(1)[2];
y4 := dsolve({ D(D(D(D(y))))(t) − y(t) = 0, y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0}, numeric):
y4(1)[2];
ode5 := diff(y(t), t$5) = y(t);
ics5 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0, D(D(D(y)))(0) = 0, D(D(D(D(y))))(0)
    = 0:
y5 := dsolve({ics5, ode5}, numeric):
y5(1)[2];
ode6 := diff(y(t), t$6) = y(t); ics6 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0, D(D(D(D(y))))(0) = 0, D(D(D(D(D(y)))))(0) = 0:
y6 := dsolve({ics6, ode6}, numeric):
y6(1)[2];
ode7 := diff(y(t), t$7) = y(t); ics7 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0, D(D(D(D(y))))(0) = 0, D(D(D(D(D(y)))))(0) = 0,
    D(D(D(D(D(D(y))))))(0) = 0:
y7 := dsolve({ics7, ode7}, numeric):
y7(1)[2];
ode8 := diff(y(t), t$8) = y(t); ics8 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0, D(D(D(D(y))))(0) = 0, D(D(D(D(D(y)))))(0) = 0,
    D(D(D(D(D(D(y))))))(0) = 0, D(D(D(D(D(D(D(y)))))))(0) = 0:
y8 := dsolve({ics8, ode8}, numeric):
y8(1)[2];
ode9 := diff(y(t), t$9) = y(t); ics9 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0, D(D(D(D(y))))(0) = 0, D(D(D(D(D(y)))))(0) = 0,
    D(D(D(D(D(D(y))))))(0) = 0, D(D(D(D(D(D(D(y)))))))(0) = 0,
    D(D(D(D(D(D(D(D(y))))))))(0) = 0:
y9 := dsolve({ics9, ode9}, numeric):
y9(1)[2];
ode10 := diff(y(t), t$10) = y(t); ics10 := y(0) = 1, D(y)(0) = 0, D(D(y))(0) = 0,
    D(D(D(y)))(0) = 0, D(D(D(D(y))))(0) = 0, D(D(D(D(D(y)))))(0) = 0,
    D(D(D(D(D(D(y))))))(0) = 0, D(D(D(D(D(D(D(y)))))))(0) = 0,
    D(D(D(D(D(D(D(D(y))))))))(0) = 0, D(D(D(D(D(D(D(D(D(y)))))))))(0) = 0:
y10 := dsolve({ics10, ode10}, numeric):
y10(1)[2];
```

$$y(t) = 1.54308053257804$$

$$y(t) = 1.16805828131390$$
$$y(t) = 1.04169144064877$$
$$ode5 := \frac{d^5}{dt^5} y(t) = y(t)$$
$$y(t) = 1.00833368226938$$
$$ode6 := \frac{d^6}{dt^6} y(t) = y(t)$$
$$y(t) = 1.00138887678885$$
$$ode7 := \frac{d^7}{dt^7} y(t) = y(t)$$
$$y(t) = 1.00019839735008$$
$$ode8 := \frac{d^8}{dt^8} y(t) = y(t)$$
$$y(t) = 1.00002479421227$$
$$ode9 := \frac{d^9}{dt^9} y(t) = y(t)$$
$$y(t) = 1.00000275343299$$
$$ode10 := \frac{d^{10}}{dt^{10}} y(t) = y(t)$$
$$y(t) = 1.00000027504110 \quad \textbf{(1)}$$

> #3
rsolve({a(n) − 3·a(n − 1) + 2·a(n − 2) = 0, a(0) = 2, a(1) = 3}, a(n));

$$2^n + 1 \quad \textbf{(2)}$$

> #4
#rsolve({a(n) - 2·a(n − 1) - 2·a(n − 2) + 2· a(n − 3) = 0, a(0) = 3, a(1) = 2, a(2) = 6},
a(n)) :
#The coefficient 2 in 2·a(n-3) creates an error in the computation.

> #5
rsolve({a(n) − a(n − 4) = 0, a(0) = 1, a(1) = 0, a(2) = 0, a(3) = 0}, a(n));

$$\frac{1}{4} + \frac{(-I)^n}{4} + \frac{I^n}{4} + \frac{(-1)^n}{4} \quad \textbf{(3)}$$

>