

```

>
> restart; libname
    "/Library/Frameworks/Maple.framework/Versions/2022/lib" (1)
> worksheetdir
    worksheetdir (2)
> currentdir(worksheetdir);
    "/Users/nsh/Documents/8-dim/2026-02-09-Eternal-DEFLATION-Inflation-M4-MAX" (3)
>
> #with(inttrans);
>
> with(LargeExpressions) :
> listrep := r → map2(op, 1, march('list', r)) :
> #NumericEventHandler( invalid_operation = `Heaviside/EventHandler` (  $value\_at\_zero = \frac{1}{2}$  ) ) :
> [kernelopts(mapledir), kernelopts(homedir), currentdir( )]
["/Library/Frameworks/Maple.framework/Versions/2022", "/Users/nsh", (4)
    "/Users/nsh/Documents/8-dim/2026-02-09-Eternal-DEFLATION-Inflation-M4-MAX"]
> #with(PDEtools, casesplit, declare) :
> # with(DEtools, gensys) :
> #with(MathML) :
> #with(StringTools) :
> #`with(FileTools) :
> #with(Worksheet) :
> #with(ListTools) :
> with(MmaTranslator);
    [FromMma, FromMmaNotebook, Mma, MmaToMaple] (5)
> with(Calendar) :
> with(StringTools) :
> with(FileTools) :
>
> #FileTools:-JoinPath([ currentdir( ), "L9i_seq2.m" ] ) ;
>
>
> #cat(kernelopts(homedir), "\\ ", "Documents", "\\ ", "myFile");
Using kernelopts(dirsep)
> #cat(kernelopts(homedir), kernelopts(dirsep), "Documents",
    kernelopts(dirsep), "myFile");
Using FileTools:-JoinPath

```

```

> #FileTools:-JoinPath([ "Documents", "myFile"],base=homedir);
>
>
>
> zvars1 :=
    FromMma( ` List[yZ0[z,t],yZ1[z,t],yZ2[z,t],yZ3[z,t]] ` );
              zvars1 := [yZ0(z,t),yZ1(z,t),yZ2(z,t),yZ3(z,t)] (6)
> zvars2 :=
    FromMma( ` List[yZ4[z,t],yZ5[z,t],yZ6[z,t],yZ7[z,t]] ` );
              zvars2 := [yZ4(z,t),yZ5(z,t),yZ6(z,t),yZ7(z,t)] (7)
>
> zvars3 :=
    FromMma( ` List[yZ8[z,t],yZ9[z,t],yZ10[z,t],yZ11[z,t]] ` );
              zvars3 := [yZ8(z,t),yZ9(z,t),yZ10(z,t),yZ11(z,t)] (8)
>
> zvars4 :=
    FromMma( ` List[yZ12[z,t],yZ13[z,t],yZ14[z,t],yZ15[z,t]] ` );
              zvars4 := [yZ12(z,t),yZ13(z,t),yZ14(z,t),yZ15(z,t)] (9)
>
> sC1 := seq(cat(_C,i) = cat(c1,i), i = 1..32);
sC1 := _C1 = c11, _C2 = c12, _C3 = c13, _C4 = c14, _C5 = c15, _C6 = c16, _C7 = c17, _C8 (10)
      = c18, _C9 = c19, _C10 = c110, _C11 = c111, _C12 = c112, _C13 = c113, _C14 = c114,
      _C15 = c115, _C16 = c116, _C17 = c117, _C18 = c118, _C19 = c119, _C20 = c120, _C21
      = c121, _C22 = c122, _C23 = c123, _C24 = c124, _C25 = c125, _C26 = c126, _C27 = c127,
      _C28 = c128, _C29 = c129, _C30 = c130, _C31 = c131, _C32 = c132
> sC2 := seq(cat(_C,i) = cat(c2,i), i = 1..32) :
> sC3 := seq(cat(_C,i) = cat(c3,i), i = 1..32) :
> sC4 := seq(cat(_C,i) = cat(c4,i), i = 1..32) :
>
> FromMma( ` List[Equal[Times[F[t],yZ0[z,t]],Plus[Times[3,yZ1[z,t]],
    Times[M,yZ3[z,t]],Derivative[0,1][yZ0][z,t],Times[6,Tan[z],
    Derivative[1,0][yZ1][z,t]]],Equal[Plus[Times[3,yZ0[z,t]],Times
    [F[t],yZ1[z,t]],Times[M,yZ2[z,t]],Derivative[0,1][yZ1][z,t],
    Times[6,Tan[z],Derivative[1,0][yZ0][z,t]],0],Equal[Plus[Times
    [M,yZ1[z,t]],Times[3,yZ3[z,t]],Times[6,Tan[z],Derivative[1,0]
    [yZ3][z,t]],Plus[Times[F[t],yZ2[z,t]],Derivative[0,1][yZ2][z,t]
    ]],Equal[Plus[Times[M,yZ0[z,t]],Times[3,yZ2[z,t]],Times[F[t],yZ3
    [z,t]],Times[6,Tan[z],Derivative[1,0][yZ2][z,t]],Derivative[0,
    1][yZ3][z,t]]] ` );
eq1 := %;

```

nops(%);

$$\left[F(t) yZ0(z, t) = \text{add}\left(i, i = \left[3 yZ1(z, t), M yZ3(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ0)(z, t), \right. \right. \\ \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ1)(z, t) \right] \right), \text{add}\left(i, i = \left[3 yZ0(z, t), F(t) yZ1(z, t), M yZ2(z, t), \right. \right. \\ \left. \left. D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ1)(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ0)(z, t) \right] \right) = 0, \text{add}\left(i, i = \left[M yZ1(z, \right. \right. \\ \left. \left. t), 3 yZ3(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ3)(z, t) \right] \right) = \text{add}\left(i, i = \left[F(t) yZ2(z, t), \right. \right. \\ \left. \left. D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ2)(z, t) \right] \right), \text{add}\left(i, i = \left[M yZ0(z, t), 3 yZ2(z, t), F(t) yZ3(z, t), \right. \right. \\ \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ2)(z, t) \right] \right) = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ3)(z, t) \right]$$

eq1 := $[F(t) yZ0(z, t) = 3 yZ1(z, t) + M yZ3(z, t) + D_2(yZ0)(z, t) + 6 \tan(z) D_1(yZ1)(z, t),$
 $3 yZ0(z, t) + F(t) yZ1(z, t) + M yZ2(z, t) + D_2(yZ1)(z, t) + 6 \tan(z) D_1(yZ0)(z, t) = 0,$
 $M yZ1(z, t) + 3 yZ3(z, t) + 6 \tan(z) D_1(yZ3)(z, t) = F(t) yZ2(z, t) + D_2(yZ2)(z, t),$
 $M yZ0(z, t) + 3 yZ2(z, t) + F(t) yZ3(z, t) + 6 \tan(z) D_1(yZ2)(z, t) = D_2(yZ3)(z, t)]$

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> FromMma(` List[Equal[Plus[Times[F[t], yZ4[z, t]], Times[3, yZ5[z, t]], Times[M, yZ7[z, t]], Times[6, Tan[z], Derivative[1, 0][yZ5][z, t]], Derivative[0, 1][yZ4][z, t]], Equal[Plus[Times[3, yZ4[z, t]], Times[M, yZ6[z, t]], Times[6, Tan[z], Derivative[1, 0][yZ4][z, t]], Plus[Times[F[t], yZ5[z, t]], Derivative[0, 1][yZ5][z, t]], Equal[Plus[Times[M, yZ5[z, t]], Times[F[t], yZ6[z, t]], Times[3, yZ7[z, t]], Derivative[0, 1][yZ6][z, t], Times[6, Tan[z], Derivative[1, 0][yZ7][z, t]], 0], Equal[Plus[Times[M, yZ4[z, t]], Times[3, yZ6[z, t]], Derivative[0, 1][yZ7][z, t], Times[6, Tan[z], Derivative[1, 0][yZ6][z, t]], Times[F[t], yZ7[z, t]]]] `);

eq2 := %;

nops(%);

$$\left[\text{add}\left(i, i = \left[F(t) yZ4(z, t), 3 yZ5(z, t), M yZ7(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ5)(z, t) \right] \right) \right. \\ \left. = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ4)(z, t), \text{add}\left(i, i = \left[3 yZ4(z, t), M yZ6(z, t), \right. \right. \right. \\ \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ4)(z, t) \right] \right) = \text{add}\left(i, i = \left[F(t) yZ5(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}}(yZ5)(z, \right. \right. \\ \left. \left. t), 3 yZ6(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}}(yZ6)(z, t) \right] \right)$$

$$\begin{aligned}
& \left. \right] \Bigg), \text{add} \left(i, i = \left[M yZ5(z, t), F(t) yZ6(z, t), 3 yZ7(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ6)(z, t), \right. \right. \\
& \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ7)(z, t) \right] \right) = 0, \text{add} \left(i, i = \left[M yZ4(z, t), 3 yZ6(z, t), \right. \right. \\
& \left. \left. D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ7)(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ6)(z, t) \right] \right) = F(t) yZ7(z, t) \Bigg] \\
eq2 := & \left[F(t) yZ4(z, t) + 3 yZ5(z, t) + M yZ7(z, t) + 6 \tan(z) D_1(yZ5)(z, t) = D_2(yZ4)(z, t), \right. \\
& 3 yZ4(z, t) + M yZ6(z, t) + 6 \tan(z) D_1(yZ4)(z, t) = F(t) yZ5(z, t) + D_2(yZ5)(z, t), \\
& M yZ5(z, t) + F(t) yZ6(z, t) + 3 yZ7(z, t) + D_2(yZ6)(z, t) + 6 \tan(z) D_1(yZ7)(z, t) = 0, \\
& \left. M yZ4(z, t) + 3 yZ6(z, t) + D_2(yZ7)(z, t) + 6 \tan(z) D_1(yZ6)(z, t) = F(t) yZ7(z, t) \right]
\end{aligned}$$

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```

> FromMma( ` List[Equal[Plus[Times[M,yZ11[z,t]],Times[3,yZ9[z,t]],
Times[6,Tan[z],Derivative[1,0][yZ9][z,t]],Derivative[0,1][yZ8]
[z,t]],Equal[Plus[Times[M,yZ10[z,t]],Times[3,yZ8[z,t]],Times[6,
Tan[z],Derivative[1,0][yZ8][z,t]],Derivative[0,1][yZ9][z,t]],
Equal[Plus[Times[3,yZ11[z,t]],Times[M,yZ9[z,t]],Derivative[0,1]
[yZ10][z,t],Times[6,Tan[z],Derivative[1,0][yZ11][z,t]],0],Equal
[Plus[Times[3,yZ10[z,t]],Times[M,yZ8[z,t]],Derivative[0,1][yZ11]
[z,t],Times[6,Tan[z],Derivative[1,0][yZ10][z,t]],0]] ` );

```

```

eq3 := %;
nops(%);

```

$$\begin{aligned}
& \left[\text{add} \left(i, i = \left[M yZ11(z, t), 3 yZ9(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ9)(z, t) \right] \right) \right. \\
& \left. = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ8)(z, t), \text{add} \left(i, i = \left[M yZ10(z, t), 3 yZ8(z, t), \right. \right. \right. \\
& \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ8)(z, t) \right] \right) = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ9)(z, t), \text{add} \left(i, i = \left[3 yZ11(z, t), \right. \right. \\
& \left. \left. M yZ9(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ10)(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ11)(z, t) \right] \right) = 0, \text{add} \left(i, i \right. \\
& \left. = \left[3 yZ10(z, t), M yZ8(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ11)(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ10)(z, \right. \right. \\
& \left. \left. t) \right] \right) = 0 \Bigg] \\
eq3 := & \left[M yZ11(z, t) + 3 yZ9(z, t) + 6 \tan(z) D_1(yZ9)(z, t) = D_2(yZ8)(z, t), M yZ10(z, t) \right. \\
& \left. + 3 yZ8(z, t) + 6 \tan(z) D_1(yZ8)(z, t) = D_2(yZ9)(z, t), 3 yZ11(z, t) + M yZ9(z, t) \right]
\end{aligned}$$

$$\begin{aligned}
& + D_2(yZ10)(z, t) + 6 \tan(z) D_1(yZ11)(z, t) = 0, 3 yZ10(z, t) + M yZ8(z, t) \\
& + D_2(yZ11)(z, t) + 6 \tan(z) D_1(yZ10)(z, t) = 0]
\end{aligned}$$

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```

> FromMma( ` List[Equal[Plus[Times[3,yZ13[z,t]],Times[M,yZ15[z,t]],
Derivative[0,1][yZ12][z,t],Times[6,Tan[z],Derivative[1,0][yZ13]
[z,t]]],0],Equal[Plus[Times[3,yZ12[z,t]],Times[M,yZ14[z,t]],
Derivative[0,1][yZ13][z,t],Times[6,Tan[z],Derivative[1,0][yZ12]
[z,t]]],0],Equal[Plus[Times[M,yZ13[z,t]],Times[3,yZ15[z,t]],
Times[6,Tan[z],Derivative[1,0][yZ15][z,t]]],Derivative[0,1]
[yZ14][z,t]],Equal[Plus[Times[M,yZ12[z,t]],Times[3,yZ14[z,t]],
Times[6,Tan[z],Derivative[1,0][yZ14][z,t]]],Derivative[0,1]
[yZ15][z,t]]] `);

```

eq4 := %;

nops(%);

$$\begin{aligned}
& \left[\text{add} \left(i, i = \left[3 yZ13(z, t), M yZ15(z, t), D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ12)(z, t), \right. \right. \\
& \quad \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ13)(z, t) \right] \right) = 0, \text{add} \left(i, i = \left[3 yZ12(z, t), M yZ14(z, t), \right. \right. \\
& \quad \left. \left. D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ13)(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ12)(z, t) \right] \right) = 0, \text{add} \left(i, i = \left[\right. \right. \\
& \quad \left. \left. M yZ13(z, t), 3 yZ15(z, t), 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ15)(z, t) \right] \right) \\
& = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ14)(z, t), \text{add} \left(i, i = \left[M yZ12(z, t), 3 yZ14(z, t), \right. \right. \\
& \quad \left. \left. 6 \tan(z) D_{\substack{1, \dots, 1 \\ 1 \text{ times}}} \substack{2, \dots, 2 \\ 0 \text{ times}}} (yZ14)(z, t) \right] \right) = D_{\substack{1, \dots, 1 \\ 0 \text{ times}}} \substack{2, \dots, 2 \\ 1 \text{ times}}} (yZ15)(z, t)]
\end{aligned}$$

$$\begin{aligned}
eq4 := & [3 yZ13(z, t) + M yZ15(z, t) + D_2(yZ12)(z, t) + 6 \tan(z) D_1(yZ13)(z, t) = 0, \\
& 3 yZ12(z, t) + M yZ14(z, t) + D_2(yZ13)(z, t) + 6 \tan(z) D_1(yZ12)(z, t) = 0, M yZ13(z, t) \\
& + 3 yZ15(z, t) + 6 \tan(z) D_1(yZ15)(z, t) = D_2(yZ14)(z, t), M yZ12(z, t) + 3 yZ14(z, t) \\
& + 6 \tan(z) D_1(yZ14)(z, t) = D_2(yZ15)(z, t)]
\end{aligned}$$

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```

> currentdir(worksheetdir);

```

"/Users/nsh/Documents/8-dim/2026-02-09-Eternal-DEFLATION-Inflation-M4-MAX"

(15)

```

> currentdir(worksheetdir);

```

"/Users/nsh/Documents/8-dim/2026-02-09-Eternal-DEFLATION-Inflation-M4-MAX" (16)

```
> tasks := ["mmM4p_seq1_", "mmM4p_seq2_", "mmM4p_seq3_", "mmM4p_seq4_"];
      tasks := ["mmM4p_seq1_", "mmM4p_seq2_", "mmM4p_seq3_", "mmM4p_seq4_"] (17)
```

>

1. Define a list of tasks (we will just use names for 4 files)

```
t_start := Date( ) :
Threads:-Sleep(1) :
t_end := Date( ) :
```

```
# Calculate the difference in seconds
# We use 'evalf' to make sure it's a decimal number, not a fraction
elapsed := evalf(DateDifference(t_start, t_end, units = 's'));
```

```
convert(elapsed, 'units', 'seconds');
convert(round(elapsed), 'units', 'seconds');
```

```
# Create the filename string
# 'cat' glues pieces of text together
# 'round' removes extra decimals from the seconds
myFileName := cat(tasks[3], "_took_", convert(elapsed, 'units', 'seconds'));
myFileName := cat(myFileName, "_", StringTools:-
  FormatTime("%Y-%m-%d_%H-%M-%S"), ".m");
```

```
# Print a message to the screen so you know it worked
printf("Finished %s. not Saving to file: %s\n", tasks[3], myFileName);
```

```
tasks := ["mmM4p_seq1_", "mmM4p_seq2_", "mmM4p_seq3_", "mmM4p_seq4_"]
elapsed := 1.005000000 s
1.005000000 s
s
```

```
myFileName := "mmM4p_seq3__took_1.005000000*Unit(s)"
```

```
myFileName := "mmM4p_seq3__took_1.005000000*Unit(s)_2026-02-13_04-15-06.m"
```

```
Finished mmM4p_seq3_. not Saving to file: mmM4p_seq3__took_1.005000000*
Unit(s)_2026-02-13_04-15-06.m
```

>

>

>

>

```
> t_start := Date( ) :
```

```
> seq3 := simplify( subs(sC3, _c1 = C3, pdsolve( eq3, zvars3 , build)) )
      assuming D(F)(t) :: positive, M :: positive, t :: positive, z
```

$:: \text{positive}, F(t) :: \text{positive};$

$$seq3 := \left\{ \begin{array}{l} yZ10(z, t) = \frac{1}{\sqrt{\sin(z)}} \left((c37 \sin(\sqrt{M^2 - 36 C3 - 9} t) \right. \end{array} \right. \quad (18)$$

$$+ c38 \cos(\sqrt{M^2 - 36 C3 - 9} t) \left(c36 \sin(z) \frac{-\sqrt{1+4 C3}}{2} + c35 \sin(z) \frac{\sqrt{1+4 C3}}{2} \right) \Bigg),$$

$$yZ11(z, t) = \frac{1}{\sqrt{\sin(z)}} \left((c33 \sin(\sqrt{M^2 - 36 C3 - 9} t) \right.$$

$$+ c34 \cos(\sqrt{M^2 - 36 C3 - 9} t) \left(\sin(z) \frac{-\sqrt{1+4 C3}}{2} c32 + \sin(z) \frac{\sqrt{1+4 C3}}{2} c31 \right) \Bigg),$$

$$yZ8(z, t) = -\frac{1}{\sqrt{\sin(z)} M} \left(3 \left(\frac{1}{3} \left(\left(\sin(z) \frac{-\sqrt{1+4 C3}}{2} c32 \right. \right. \right.$$

$$+ \sin(z) \frac{\sqrt{1+4 C3}}{2} c31 \Bigg) \left(\cos(\sqrt{M^2 - 36 C3 - 9} t) c33 \right.$$

$$\left. - \sin(\sqrt{M^2 - 36 C3 - 9} t) c34 \right) \sqrt{M^2 - 36 C3 - 9} \Bigg)$$

$$+ \sqrt{1+4 C3} \left(c35 \sin(z) \frac{\sqrt{1+4 C3}}{2} \right.$$

$$\left. - c36 \sin(z) \frac{-\sqrt{1+4 C3}}{2} \right) \left(c37 \sin(\sqrt{M^2 - 36 C3 - 9} t) \right.$$

$$\left. + c38 \cos(\sqrt{M^2 - 36 C3 - 9} t) \right) \Bigg), yZ9(z, t) =$$

$$\begin{aligned}
& - \frac{1}{\sqrt{\sin(z)} M} \left(\left(\cos(\sqrt{M^2 - 36 C3 - 9} t) c37 \right. \right. \\
& - \sin(\sqrt{M^2 - 36 C3 - 9} t) c38) \left(c36 \sin(z) - \frac{\sqrt{1 + 4 C3}}{2} \right. \\
& + c35 \sin(z) \frac{\sqrt{1 + 4 C3}}{2} \left. \right) \sqrt{M^2 - 36 C3 - 9} + 3 \left(c33 \sin(\sqrt{M^2 - 36 C3 - 9} t) \right. \\
& + c34 \cos(\sqrt{M^2 - 36 C3 - 9} t) \left. \right) \sqrt{1 + 4 C3} \left(\sin(z) \frac{\sqrt{1 + 4 C3}}{2} c31 \right. \\
& \left. \left. - \sin(z) - \frac{\sqrt{1 + 4 C3}}{2} c32 \right) \right) \left. \right) \left. \right\}
\end{aligned}$$

```

> t_end := Date( ) :
> elapsed := evalf( DateDifference(t_start, t_end, units = 's') ) :
> myFileName := cat(tasks[3], "_took_", convert(elapsed, 'units', 'seconds'), "s_");
myFileName := cat(myFileName, "_", StringTools:-FormatTime("%Y-%m-%d_%H-%M-%S"),
    ".m");
    myFileName := "mmM4p_seq3__took_1.005000000*Unit(s)s_"
myFileName := "mmM4p_seq3__took_1.005000000*Unit(s)s__2026-02-13_04-28-24.m" (19)

```

```

>
> save seq3, myFileName;
> save seq3, "2026-02-13_mmM4p_seq3.m";
>
> t_start := Date( ) :
> seq4 := simplify( subs(sC4, _c1 = C4, pdsolve( eq4, zvars4) ))
    assuming D(F)(t) :: positive, M :: positive, t :: positive, z
    :: positive, F(t) :: positive;

```

$$\begin{aligned}
seq4 := & \left\{ yZ12(z, t) = - \frac{1}{\sqrt{\sin(z)} M} \left(3 \left(- \frac{1}{3} \left(\left(\cos(\sqrt{M^2 - 36 C4 - 9} t) c43 \right. \right. \right. \right. \\
& - \sin(\sqrt{M^2 - 36 C4 - 9} t) c44) \left(c42 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} \right. \\
& + c41 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \left. \right) \sqrt{M^2 - 36 C4 - 9} \left. \right) + \left(c45 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \right. \\
& \left. \left. - c46 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} \right) \sqrt{1 + 4 C4} \left(c47 \sin(\sqrt{M^2 - 36 C4 - 9} t) \right. \right. \\
& \left. \left. \left. \right. \right. \right. \right.
\end{aligned} \tag{20}$$

$$+ c48 \cos(\sqrt{M^2 - 36 C4 - 9} t)) \Big) \Big), yZ13(z, t)$$

$$= \frac{1}{\sqrt{\sin(z)} M} \left(\left(\cos(\sqrt{M^2 - 36 C4 - 9} t) c47 \right. \right.$$

$$- \sin(\sqrt{M^2 - 36 C4 - 9} t) c48) \left(c46 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} \right.$$

$$+ c45 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \Big) \sqrt{M^2 - 36 C4 - 9} - 3 \left(c41 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \right.$$

$$- c42 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} \Big) \left(c43 \sin(\sqrt{M^2 - 36 C4 - 9} t) \right.$$

$$+ c44 \cos(\sqrt{M^2 - 36 C4 - 9} t)) \sqrt{1 + 4 C4} \Big), yZ14(z, t)$$

$$= \frac{1}{\sqrt{\sin(z)}} \left(\left(c47 \sin(\sqrt{M^2 - 36 C4 - 9} t) \right. \right.$$

$$+ c48 \cos(\sqrt{M^2 - 36 C4 - 9} t)) \left(c46 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} + c45 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \right) \Big),$$

$$yZ15(z, t) = \frac{1}{\sqrt{\sin(z)}} \left(\left(c43 \sin(\sqrt{M^2 - 36 C4 - 9} t) \right. \right.$$

$$+ c44 \cos(\sqrt{M^2 - 36 C4 - 9} t)) \left(c42 \sin(z) - \frac{\sqrt{1 + 4 C4}}{2} + c41 \sin(z) \frac{\sqrt{1 + 4 C4}}{2} \right) \Big) \Big\}$$

>

> $t_end := Date() :$

> $elapsed := evalf(DateDifference(t_start, t_end, units = 's')) :$

>

> $myFileName := cat(tasks[4], "_took_", convert(elapsed, 'units', 'seconds')) :$

$myFileName := cat(myFileName, "_", StringTools:-FormatTime("%Y-%m-%d_%H-%M-%S"),$
 $"m");$

$myFileName := "mmM4p_seq4__took_1.005000000*Unit(s)_2026-02-13_04-30-36.m" \quad (21)$

```

>
> # SaveComplete(seq4);
> save seq4 , myFileName
> save seq4, "2026-02-13_mmmM4p_seq4.m";
>
findme 1
> eq1;
> nops(%);
[ F(t) yZ0(z, t) = 3 yZ1(z, t) + M yZ3(z, t) + D2(yZ0)(z, t) + 6 tan(z) D1(yZ1)(z, t),
  3 yZ0(z, t) + F(t) yZ1(z, t) + M yZ2(z, t) + D2(yZ1)(z, t) + 6 tan(z) D1(yZ0)(z, t) = 0,
  M yZ1(z, t) + 3 yZ3(z, t) + 6 tan(z) D1(yZ3)(z, t) = F(t) yZ2(z, t) + D2(yZ2)(z, t),
  M yZ0(z, t) + 3 yZ2(z, t) + F(t) yZ3(z, t) + 6 tan(z) D1(yZ2)(z, t) = D2(yZ3)(z, t) ]
4 (22)

```

```

>
> t_start := Date( ) :
> seq1 := simplify( subs( sC1, _c1 = C1,
  convert( pdsolve( eq1,
    zvars1), int, method = value ) ) )
  assuming D(F)(t) :: positive, M :: positive, t :: positive, z
  :: positive, F(t) :: positive;
seq1 := [
  yZ0(z, t) =  $\frac{1}{2 M F(t)} \left( \frac{\partial^2}{\partial t^2} yZ3(z, t) - 36 \tan(z)^2 \left( \frac{\partial^2}{\partial z^2} yZ3(z, t) \right) + ( \right.$  (23)

```

$$-36 \tan(z)^3 - 72 \tan(z) \left(\frac{\partial}{\partial z} yZ3(z,t)\right) - yZ3(z,t) \left(\frac{d}{dt} F(t)\right) + (M^2 - F(t)^2$$

$$-9) yZ3(z,t) \Big), yZ1(z,t) = \frac{1}{\sqrt{\sin(z)} \, M F(t)^2 \cos(z)^5} \Bigg[$$

$$-\frac{1}{12} \Bigg(\cos(Mt) \, e^{-\Big(\int F(t) \, dt\Big)} \Bigg(\int \frac{1}{F(t)^3} \Bigg(36 \cos(Mt) \, e^{\int F(t) \, dt} \Bigg(-\frac{1}{36} \Bigg(\Bigg(\int$$

$$-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left(2\left((-18F(t)^2\cos(z)^3+18F(t)^2\cos(z))\left(\frac{\partial^4}{\partial t^2\partial z^2}yZ3(z,t)\right)\right.\right.$$

$$\left.-\frac{F(t)^2\cos(z)^3\left(\frac{\partial^4}{\partial t^4}yZ3(z,t)\right)}{2}+F(t)\cos(z)^3\left(F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\frac{\partial^3}{\partial t^3}yZ3(z,\right.\right.$$

$$\left.t\right)+18F(t)^2\sin(z)\left(\cos(z)^2+1\right)\left(\frac{\partial^3}{\partial t^2\partial z}yZ3(z,t)\right)+(36F(t)\cos(z)^3$$

$$-36 F(t) \cos(z) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ3(z, t) \right)$$

$$+ \frac{yZ3(z, t) F(t)^2 \cos(z)^3 \left(\frac{d^3}{dt^3} F(t) \right)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \right.$$

$$\left. \left. + 2 \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (M^2 + F(t)^2 - 9) \right) \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) \right)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

$$yZ3(z, t) \right) - 36 F(t) \left(\frac{d}{dt} F(t) \right) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right)$$

$$+ \frac{1}{2} \left(\left(2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} \right. \right. \right.$$

$$yZ3(z,t)\Big)+yZ3(z,t)\cos(z)^3\left(M^2-F(t)^2-3\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)F(t)\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)\Big)$$

$$+\left(F(t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)-\left(\right.$$

$$\left.-36\sin(z)\cos(z)^2-36\sin(z)\right)\left(\frac{\partial}{\partial z}yZ3(z,t)\right)+yZ3(z,t)\cos(z)^3\left(M^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right.$$

$$-9)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big)\mathrm{d}z\Big)\cos(z)^5\Big)+\left(\frac{1}{18}\left(\left(\int\right.\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36F(t)\cos(z)^3-36F(t)\cos(z))\left(\frac{\partial^3}{\partial t\partial z^2}yZ3(z,t)\right)+\left(\frac{\partial^3}{\partial t^3}\right.\right.$$

$$yZ3(z,t)\Big)F(t)\cos(z)^3-2\cos(z)^3\left(F(t)^2+\frac{\frac{\mathrm{d}}{\mathrm{d}t}F(t)}{2}\right)\left(\frac{\partial^2}{\partial t^2}yZ3(z,t)\right)$$

$$-36 F(t) \sin(z) \left(\cos(z)^2 + 1\right) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t)\right) + \left(-36 \cos(z)^3 + 36 \cos(z)\right) \left(\frac{d}{dt}\right.$$

$$F(t) \left.\right) \left(\frac{\partial^2}{\partial z^2} yZ3(z, t)\right) - \left(\frac{d^2}{dt^2} F(t)\right) yZ3(z, t) F(t) \cos(z)^3 + F(t) \cos(z)^3 \left(M^2\right.$$

$$+ F(t)^2 - \frac{d}{dt} F(t) - 9 \left.\right) \left(\frac{\partial}{\partial t} yZ3(z, t)\right) - \left((-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z}\right.\right.$$

$$yZ3(z,t)\Big)+yZ3(z,t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\Big)\mathrm{d}z\Big)$$

$$\cos(z)^5\Big)-\frac{1}{36}\left(\cos(z)^5\left(M^2+F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\right.\right.$$

$$\int \frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36\cos(z)^3-36\cos(z))\left(\frac{\partial^2}{\partial z^2}yZ3(z,t)\right)+\left(\frac{\partial^2}{\partial t^2}yZ3(z,\right.\right.$$

$$t) \Big) \cos(z)^3 + \big(-36 \sin(z) \cos(z)^2 - 36 \sin(z)\big) \left(\frac{\partial}{\partial z} yZ3(z,t)\right) + \left(-2 F(t) \left(\frac{\partial}{\partial t}\right.\right.$$

$$\left. yZ3(z,t) \right) + yZ3(z,t) \left(M^2 + F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 9\right) \cos(z)^3 \Big) \mathrm{d}z \Big) \Big)$$

$$+ \sin(z)^{3/2} \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z,t)\right) \cos(z)^4 - 36 \sin(z)^{7/2} \left(\frac{\partial^3}{\partial z^3} yZ3(z,t)\right) \cos(z)^2$$

$$+ \cos(z)^4 \left(-2 F(t) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right) + \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) \right. \right.$$

$$\left. \left. - 117 \right) \right) \sin(z)^{3/2} - 198 \sin(z)^{7/2} \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \cos(z)^2 - 108 \sin(z)^{11/2} \left(\frac{\partial}{\partial z} \right.$$

$$yZ3(z, t) \Big) + \frac{1}{2} \Big(\cos(z) \left(-324 \sin(z)^{5/2} \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) \cos(z)^2 - 216 \left(\frac{\partial^2}{\partial z^2} \right. \right.$$

$$yZ3(z,t)\Big)\sin(z)^{9/2}+\cos(z)^4\sqrt{\sin(z)}\left(\frac{\partial^2}{\partial t^2}yZ3(z,t)-2F(t)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)\right.$$

$$+yZ3(z,t)\left(M^2-3F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)\Big)\Big)\Big)F(t)^2\Big)\mathrm{d}t\Big)F(t)^2\Big)$$

$$+\frac{1}{12}\left(\sin(Mt)\,\mathrm{e}^{-\left(\int F(t)\,\mathrm{d}t\right)}\left(\int-\frac{1}{F(t)^3}\left(36\,\mathrm{e}^{\int F(t)\,\mathrm{d}t}\left(-\frac{1}{36}\left(\left(\int\right.\right.\right.\right.\right.\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left(2\left((-18F(t)^2\cos(z)^3+18F(t)^2\cos(z))\left(\frac{\partial^4}{\partial t^2\partial z^2}yZ3(z,t)\right)\right.\right.$$

$$\left.-\frac{F(t)^2\cos(z)^3\left(\frac{\partial^4}{\partial t^4}yZ3(z,t)\right)}{2}+F(t)\cos(z)^3\left(F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\frac{\partial^3}{\partial t^3}yZ3(z,\right.\right.$$

$$\left.t\right)+18F(t)^2\sin(z)\left(\cos(z)^2+1\right)\left(\frac{\partial^3}{\partial t^2\partial z}yZ3(z,t)\right)+(36F(t)\cos(z)^3$$

$$-36 F(t) \cos(z) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ3(z, t) \right)$$

$$+ \frac{yZ3(z, t) F(t)^2 \cos(z)^3 \left(\frac{d^3}{dt^3} F(t) \right)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \right.$$

$$\left. \left. + 2 \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (M^2 + F(t)^2 - 9) \right) \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) \right)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

$$yZ3(z, t) \right) - 36 F(t) \left(\frac{d}{dt} F(t) \right) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right)$$

$$+ \frac{1}{2} \left(\left(2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} \right. \right.$$

$$yZ3(z,t)\Big)+yZ3(z,t)\cos(z)^3\left(M^2-F(t)^2-3\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)F(t)\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)\Big)$$

$$+\left(F(t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)-\left(\right.$$

$$\left.-36\sin(z)\cos(z)^2-36\sin(z)\right)\left(\frac{\partial}{\partial z}yZ3(z,t)\right)+yZ3(z,t)\cos(z)^3\left(M^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right.$$

$$-9)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big)\mathrm{d}z\Big)\cos(z)^5\Big)+\left(\frac{1}{18}\left(\left(\int\right.\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36F(t)\cos(z)^3-36F(t)\cos(z))\left(\frac{\partial^3}{\partial t\partial z^2}yZ3(z,t)\right)+\left(\frac{\partial^3}{\partial t^3}\right.\right.$$

$$yZ3(z,t)\Big)F(t)\cos(z)^3-2\cos(z)^3\left(F(t)^2+\frac{\frac{\mathrm{d}}{\mathrm{d}t}F(t)}{2}\right)\left(\frac{\partial^2}{\partial t^2}yZ3(z,t)\right)$$

$$-36 F(t) \sin(z) \left(\cos(z)^2 + 1\right) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t)\right) + \left(-36 \cos(z)^3 + 36 \cos(z)\right) \left(\frac{d}{dt}\right.$$

$$F(t) \left.\right) \left(\frac{\partial^2}{\partial z^2} yZ3(z, t)\right) - \left(\frac{d^2}{dt^2} F(t)\right) yZ3(z, t) F(t) \cos(z)^3 + F(t) \cos(z)^3 \left(M^2\right.$$

$$+ F(t)^2 - \frac{d}{dt} F(t) - 9 \left.\right) \left(\frac{\partial}{\partial t} yZ3(z, t)\right) - \left((-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z}\right.\right.$$

$$yZ3(z,t)\Big)+yZ3(z,t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\Big)\mathrm{d}z\Big)$$

$$\cos(z)^5\Big)-\frac{1}{36}\left(\cos(z)^5\left(M^2+F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\right.\right.$$

$$\int \frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36\cos(z)^3-36\cos(z))\left(\frac{\partial^2}{\partial z^2}yZ3(z,t)\right)+\left(\frac{\partial^2}{\partial t^2}yZ3(z,\right.\right.$$

$$t) \Big) \cos(z)^3 + \big(-36 \sin(z) \cos(z)^2 - 36 \sin(z)\big) \left(\frac{\partial}{\partial z} yZ3(z,t)\right) + \left(-2 F(t) \left(\frac{\partial}{\partial t}\right.\right.$$

$$\left. yZ3(z,t) \right) + yZ3(z,t) \left(M^2 + F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 9\right) \cos(z)^3 \Big) \mathrm{d}z \Big) \Big)$$

$$+ \sin(z)^{3/2} \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z,t)\right) \cos(z)^4 - 36 \sin(z)^{7/2} \left(\frac{\partial^3}{\partial z^3} yZ3(z,t)\right) \cos(z)^2$$

$$+ \cos(z)^4 \left(-2 F(t) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right) + \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) \right. \right.$$

$$\left. \left. - 117 \right) \right) \sin(z)^{3 / 2} - 198 \sin(z)^{7 / 2} \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \cos(z)^2 - 108 \sin(z)^{11 / 2} \left(\frac{\partial}{\partial z} \right.$$

$$yZ3(z, t) \Big) + \frac{1}{2} \Big(\cos(z) \left(-324 \sin(z)^{5 / 2} \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) \cos(z)^2 - 216 \left(\frac{\partial^2}{\partial z^2} \right. \right.$$

$$yZ3(z,t)\Big)\sin(z)^{9\mid 2}+\cos(z)^4\sqrt{\sin(z)}\left(\frac{\partial^2}{\partial t^2}\,yZ3(z,t)-2\,F(t)\left(\frac{\partial}{\partial t}\,yZ3(z,t)\right)\right.$$

$$+yZ3(z,t)\left(M^2-3\,F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)-9\right)\Big)\Big)\Big)\Big)\Big)F(t)^2\Big)\sin(M\,t)\Big)\,\mathrm{d}t\Big)F(t)^2\Big)$$

$$+\cos(z)^4\left(-\frac{1}{24}\left(\left(\int-\frac{1}{\sqrt{\sin(z)}\,(\cos(2\,z)+1)}\left(3\left(-\cos(z)\right.\right.\right.\right.\right.$$

$$+ \frac{\cos(3z)}{3} \Big) F(t) \left(\frac{\partial^3}{\partial t^3} yZ3(z,t) \right) + 12 F(t) (\cos(z) - \cos(3z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ3(z,t) \right)$$

$$+ \left(\cos(z) + \frac{\cos(3z)}{3} \right) \left(2 F(t)^2 + \frac{d}{dt} F(t) \right) \left(\frac{\partial^2}{\partial t^2} yZ3(z,t) \right) + 12 F(t) (\sin(3z))$$

$$+ 5 \sin(z) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z,t) \right) - 12 \left(\frac{d}{dt} F(t) \right) (\cos(z) - \cos(3z)) \left(\frac{\partial^2}{\partial z^2} yZ3(z,t) \right)$$

$$+ F(t) \, yZ3(z, t) \left(\cos(z) + \frac{\cos(3 \, z)}{3} \right) \left(\frac{\mathrm{d}^2}{\mathrm{d} t^2} F(t) \right) + \left(\right.$$

$$- \frac{F(t) \left(M^2 + F(t)^2 - \frac{\mathrm{d}}{\mathrm{d} t} F(t) - 9 \right) \left(\frac{\partial}{\partial t} yZ3(z, t) \right)}{3}$$

$$+ \frac{yZ3(z, t) \left(\frac{\mathrm{d}}{\mathrm{d} t} F(t) \right) \left(M^2 - F(t)^2 - \frac{\mathrm{d}}{\mathrm{d} t} F(t) - 9 \right)}{3} \cos(3 \, z) - F(t) \cos(z) \left(M^2 \right.$$

$$+ F(t)^2 - \frac{\mathrm{d}}{\mathrm{d} t} F(t) - 9 \Big) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) + \left((-12 \sin(3 z) - 60 \sin(z)) \left(\frac{\partial}{\partial z} yZ3(z,$$

$$t) \Big) + yZ3(z, t) \cos(z) \left(M^2 - F(t)^2 - \frac{\mathrm{d}}{\mathrm{d} t} F(t) - 9 \right) \Big) \left(\frac{\mathrm{d}}{\mathrm{d} t} F(t) \right) \Big) \mathrm{d} z \Big) \cos(z) \Big)$$

$$+ F(t)^2 \left(-\frac{1}{24} \left(\left(\int \frac{1}{\sqrt{\sin(z)} \, (\cos(2 z) + 1)} \left(3 \left(\cos(z) + \frac{\cos(3 z)}{3} \right) \left(\frac{\partial^2}{\partial t^2} \right. \right. \right. \right.$$

$$yZ3(z,t)\Bigg)+(-12\cos(z)+12\cos(3z))\left(\frac{\partial^2}{\partial z^2}yZ3(z,t)\right)+\left(\right.$$

$$\left.-\frac{2F(t)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)}{3}+\frac{yZ3(z,t)\left(M^2+F(t)^2-\frac{d}{dt}F(t)-9\right)}{3}\right)\cos(3z)$$

$$-2F(t)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)\cos(z)+(-12\sin(3z)-60\sin(z))\left(\frac{\partial}{\partial z}yZ3(z,t)\right)$$

$$+yZ3(z,t)\cos(z)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Bigg)\mathrm{d}z\Bigg)\cos(z)\Bigg)$$

$$+M\cos(z)\left(\cos(Mt)c_{l2}-c_{l1}\sin(Mt)\right)\mathrm{e}^{-\left(\int F(t)\,\mathrm{d}t\right)}-3yZ3(z,t)\sqrt{\sin(z)}\cos(z)$$

$$-6\left(\frac{\partial}{\partial z}yZ3(z,t)\sin(z)^{3/2}\right)\Bigg)\Bigg),yZ2(z,t)=\frac{1}{\sqrt{\sin(z)}F(t)M\cos(z)^5}\Bigg)$$

$$-\frac{1}{12}\left(\sin(M\,t)\,{\rm e}^{-\left(\int F(t)\,{\rm d}t\right)}\right)\left(\int\frac{1}{F(t)^3}\left(36\cos(M\,t)\,{\rm e}^{\int F(t)\,{\rm d}t}\right)-\frac{1}{36}\left(\left(\int\right.\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)}\,\cos(z)^2}\left(2\left(\left(-18\,F(t)^2\cos(z)^3+18\,F(t)^2\cos(z)\right)\left(\frac{\partial^4}{\partial t^2\partial z^2}\,yZ3(z,t)\right)\right.\right.$$

$$-\frac{F(t)^2\cos(z)^3\left(\frac{\partial^4}{\partial t^4}\,yZ3(z,t)\right)}{2}+F(t)\cos(z)^3\left(F(t)^2+\frac{{\rm d}}{{\rm d}t}\,F(t)\right)\left(\frac{\partial^3}{\partial t^3}\,yZ3(z,\right.$$

$$t) \Big) + 18 \, F(t)^2 \sin(z) \, (\cos(z)^2 + 1) \left(\frac{\partial^3}{\partial t^2 \partial z} \, yZ3(z, t) \right) + (36 \, F(t) \cos(z)^3$$

$$- 36 \, F(t) \cos(z)) \left(\frac{\mathrm{d}}{\mathrm{d} t} \, F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} \, yZ3(z, t) \right)$$

$$+ \frac{yZ3(z, t) \, F(t)^2 \cos(z)^3 \left(\frac{\mathrm{d}^3}{\mathrm{d} t^3} \, F(t) \right)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{\mathrm{d}^2}{\mathrm{d} t^2} \, F(t) \right) F(t) \right. \right.$$

$$+ 2 \left(\frac{\mathrm{d}}{\mathrm{d}t} F(t) \right)^2 - F(t)^2 \left(\frac{\mathrm{d}}{\mathrm{d}t} F(t) \right) + F(t)^2 \left(M^2 + F(t)^2 - 9 \right) \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) \Bigg)$$

$$+ 18 \cos(z) \left(\cos(z) - 1 \right) \left(\cos(z) + 1 \right) \left(\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2} F(t) \right) F(t) - 2 \left(\frac{\mathrm{d}}{\mathrm{d}t} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

$$yZ3(z, t) \Bigg) - 36 F(t) \left(\frac{\mathrm{d}}{\mathrm{d}t} F(t) \right) \sin(z) \left(\cos(z)^2 + 1 \right) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right)$$

$$+ \frac{1}{2} \left(\left(2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \cos(z)^3 + \left(-36 \sin(z) \cos(z)^2 - 36 \sin(z) \right) \left(\frac{\partial}{\partial z} \right. \right. \right.$$

$$\left. yZ3(z, t) \right) + yZ3(z, t) \cos(z)^3 \left(M^2 - F(t)^2 - 3 \frac{d}{dt} F(t) - 9 \right) \Big) F(t) \left(\frac{d^2}{dt^2} F(t) \right) \Big) \\$$

$$+ \left(F(t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) - \left(\left(\right. \right. \right.$$

$$-36 \sin(z) \cos(z)^2 - 36 \sin(z) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) + yZ3(z, t) \cos(z)^3 \left(M^2 - \frac{d}{dt} F(t) \right)$$

$$-9)\Bigg)\left(\frac{d}{dt}F(t)\right)\Bigg)\left(\frac{d}{dt}F(t)\right)\Bigg)dz\cos(z)^5\Bigg)+\left[\frac{1}{18}\left(\left(\int_0^{\pi/2}\sin(2t)\cos(2t)dt\right)\left(\int_0^{\pi/2}\sin(2t)\cos(2t)dt\right)\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 F(t) \cos(z)^3 - 36 F(t) \cos(z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ(z, t) \right) + \left(\frac{\partial^3}{\partial t^3} \right. \right.$$

$$yZ3(z,t)\Big)F(t)\cos(z)^3-2\cos(z)^3\left(F(t)^2+\frac{\frac{\mathrm{d}}{\mathrm{d}t}F(t)}{2}\right)\left(\frac{\partial^2}{\partial t^2}yZ3(z,t)\right)$$

$$-36F(t)\sin(z)\left(\cos(z)^2+1\right)\left(\frac{\partial^2}{\partial t\partial z}yZ3(z,t)\right)+\left(-36\cos(z)^3+36\cos(z)\right)\left(\frac{\mathrm{d}}{\mathrm{d}t}\right.$$

$$F(t)\Big)\left(\frac{\partial^2}{\partial z^2}yZ3(z,t)\right)-\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)yZ3(z,t)F(t)\cos(z)^3+F(t)\cos(z)^3\left(M^2\right.$$

$$+ F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 9 \Big) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) - \left((-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} \right. \right.$$

$$\left. yZ3(z, t) \right) + yZ3(z, t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 9 \right) \Big) \left(\frac{\mathrm{d}}{\mathrm{d}t} F(t) \right) \Big) \mathrm{d}z \Big)$$

$$\cos(z)^5 \Big) - \frac{1}{36} \left(\cos(z)^5 \left(M^2 + F(t)^2 + \frac{\mathrm{d}}{\mathrm{d}t} F(t) \right) \left(\right. \right.$$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 \cos(z)^3 - 36 \cos(z)) \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) + \left(\frac{\partial^2}{\partial t^2} yZ3(z,$$

$$t) \right) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) + \left(-2 F(t) \left(\frac{\partial}{\partial t} \right. \right.$$

$$\left. yZ3(z, t) \right) + yZ3(z, t) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \cos(z)^3 \Big) dz \Big) \Big)$$

$$+ \sin(z)^{3 \mid 2} \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z, t) \right) \cos(z)^4 - 36 \sin(z)^{7 \mid 2} \left(\frac{\partial^3}{\partial z^3} yZ3(z, t) \right) \cos(z)^2$$

$$+ \cos(z)^4 \left(-2 F(t) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right) + \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) \right. \right.$$

$$\left. \left. - 117 \right) \right) \sin(z)^{3 \mid 2} - 198 \sin(z)^{7 \mid 2} \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \cos(z)^2 - 108 \sin(z)^{11 \mid 2} \left(\frac{\partial}{\partial z} \right.$$

$$yZ3(z, t) \Big) + \frac{1}{2} \left(\cos(z) \left(-324 \sin(z)^5 \right)^{1/2} \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) \cos(z)^2 - 216 \left(\frac{\partial^2}{\partial z^2} \right.$$

$$yZ3(z, t) \sin(z)^{9/2} + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) - 2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \right)$$

$$+ yZ3(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \right) \right) \right) F(t)^2 \right) dt F(t) \right)$$

$$-\frac{1}{12}\left(\cos(Mt)e^{-\left(\int F(t)dt\right)}\left[-\frac{1}{F(t)^3}36e^{\int F(t)dt}-\frac{1}{36}\left(\left(\int\right)\right)\right]\right)$$

$$- \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left(2 \left((-18 F(t)^2 \cos(z)^3 + 18 F(t)^2 \cos(z)) \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ3(z, t) \right) \right. \right.$$

$$\left. - \frac{F(t)^2 \cos(z)^3 \left(\frac{\partial^4}{\partial t^4} yZ3(z, t) \right)}{2} + F(t) \cos(z)^3 \left(F(t)^2 + \frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t^3} yZ3(z, \right. \right.$$

$$\left. t) \right) + 18 F(t)^2 \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z, t) \right) + (36 F(t) \cos(z)^3$$

$$- 36 F(t) \cos(z)) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ3(z, t) \right)$$

$$+ \frac{yZ3(z, t) F(t)^2 \cos(z)^3 \left(\frac{d^3}{dt^3} F(t) \right)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \right.$$

$$\left. + 2 \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (M^2 + F(t)^2 - 9) \right) \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) \Bigg)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

$$yZ3(z, t) \right) - 36 F(t) \left(\frac{d}{dt} F(t) \right) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right)$$

$$+ \frac{1}{2} \left(\left(2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} \right. \right.$$

$$yZ3(z, t) \right) + yZ3(z, t) \cos(z)^3 \left(M^2 - F(t)^2 - 3 \frac{d}{dt} F(t) - 9 \right) \left(F(t) \left(\frac{d^2}{dt^2} F(t) \right) \right)$$

$$+ \left(F(t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) - \left(\right.$$

$$- 36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) + yZ3(z, t) \cos(z)^3 \left(M^2 - \frac{d}{dt} F(t) \right)$$

$$-9)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\Big)\Big)\Big)\mathrm{d}z\Big)\cos(z)^5\Big)+\left(\frac{1}{18}\left(\left(\int\right.\right.\right.$$

$$-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36F(t)\cos(z)^3-36F(t)\cos(z))\left(\frac{\partial^3}{\partial t\partial z^2}yZ3(z,t)\right)+\left(\frac{\partial^3}{\partial t^3}\right.\right.$$

$$yZ3(z,t)\Big)F(t)\cos(z)^3-2\cos(z)^3\left(F(t)^2+\frac{\frac{\mathrm{d}}{\mathrm{d}t}F(t)}{2}\right)\left(\frac{\partial^2}{\partial t^2}yZ3(z,t)\right)$$

$$-36F(t)\sin(z)\left(\cos(z)^2+1\right)\left(\frac{\partial^2}{\partial t\partial z}yZ3(z,t)\right)+\left(-36\cos(z)^3+36\cos(z)\right)\left(\frac{\mathrm{d}}{\mathrm{d}t}\right.$$

$$F(t)\Big)\left(\frac{\partial^2}{\partial z^2}yZ3(z,t)\right)-\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)yZ3(z,t)F(t)\cos(z)^3+F(t)\cos(z)^3\left(M^2\right.$$

$$+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\Big)\left(\frac{\partial}{\partial t}yZ3(z,t)\right)-\left((-36\sin(z)\cos(z)^2-36\sin(z)\right)\left(\frac{\partial}{\partial z}\right.$$

$$yZ3(z, t) \Big) + yZ3(z, t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \left(\frac{d}{dt} F(t) \right) \Big) dz \Big)$$

$$\cos(z)^5 \Big) - \frac{1}{36} \left(\cos(z)^5 \left(M^2 + F(t)^2 + \frac{d}{dt} F(t) \right) \left(\right.$$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 \cos(z)^3 - 36 \cos(z)) \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) + \left(\frac{\partial^2}{\partial t^2} yZ3(z,$$

$$t) \Big) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) + \left(-2 F(t) \left(\frac{\partial}{\partial t} \right.$$

$$yZ3(z, t) \Big) + yZ3(z, t) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \cos(z)^3 \Big) dz \Big) \Big)$$

$$+ \sin(z)^{3/2} \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z, t) \right) \cos(z)^4 - 36 \sin(z)^{7/2} \left(\frac{\partial^3}{\partial z^3} yZ3(z, t) \right) \cos(z)^2$$

$$+ \cos(z)^4 \left(-2 F(t) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right) + \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) \right) \right)$$

$$-117) \sin(z)^{3/2} - 198 \sin(z)^{7/2} \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \cos(z)^2 - 108 \sin(z)^{11/2} \left(\frac{\partial}{\partial z} \right.$$

$$yZ3(z, t) \Big) + \frac{1}{2} \left(\cos(z) \left(-324 \sin(z)^5 \right)^{1/2} \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) \cos(z)^2 - 216 \left(\frac{\partial^2}{\partial z^2} \right.$$

$$yZ3(z, t) \sin(z)^{9/2} + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) - 2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \right)$$

$$+ yZ3(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \right) \right) F(t)^2 \sin(M t) dt F(t)$$

$$+ M \cos(z)^5 \left(-\frac{1}{24} \left(\int \frac{1}{\sqrt{\sin(z)} (\cos(2z) + 1)} \right) \left(3 \left(\cos(z) \right. \right. \right.$$

$$\begin{aligned}
& + \frac{\cos(3z)}{3} \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) + (-12 \cos(z) + 12 \cos(3z)) \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) + \left(\right. \\
& - \frac{2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right)}{3} + \frac{yZ3(z, t) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right)}{3} \left. \right) \cos(3z) \\
& - 2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) \cos(z) + (-12 \sin(3z) - 60 \sin(z)) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \\
& + yZ3(z, t) \cos(z) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left. \right) dz \\
& + e^{-\left(\int F(t) dt \right)} F(t) (c11 \cos(Mt) + \sin(Mt) c12) \left. \right) \left. \right) \left\{ \left[\frac{\partial^4}{\partial t^4} yZ3(z, t) \right. \right. \\
& = \frac{1}{F(t)^2} \left(72 \tan(z)^2 F(t)^2 \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ3(z, t) \right) - 1296 \tan(z)^4 F(t)^2 \left(\frac{\partial^4}{\partial z^4} yZ3(z, t) \right) \right. \\
& + 72 F(t)^2 \tan(z) (\tan(z)^2 + 2) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ3(z, t) \right) - 7776 \tan(z)^3 (\tan(z)^2 \\
& + \frac{4}{3}) F(t)^2 \left(\frac{\partial^3}{\partial z^3} yZ3(z, t) \right) + 2 F(t) \left(\frac{\partial^3}{\partial t^3} yZ3(z, t) \right) \left(\frac{d}{dt} F(t) \right) \\
& - 72 \tan(z)^2 F(t) \left(\frac{\partial^3}{\partial t \partial z^2} yZ3(z, t) \right) \left(\frac{d}{dt} F(t) \right) + F(t)^2 yZ3(z, t) \left(\frac{d^3}{dt^3} F(t) \right) + 72 \left(\right. \\
& - \frac{\left(\frac{d^2}{dt^2} F(t) \right) F(t)}{2} + \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (-270 \tan(z)^4 + M^2
\end{aligned}$$

$$\begin{aligned}
& - F(t)^2 - 504 \tan(z)^2 - 261) \Bigg) \tan(z)^2 \left(\frac{\partial^2}{\partial z^2} yZ3(z, t) \right) + \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \\
& - 2 \left(\frac{d}{dt} F(t) \right)^2 + 2 F(t)^2 \left(\frac{d}{dt} F(t) \right) - 2 F(t)^2 (M^2 - F(t)^2 - 9) \Bigg) \left(\frac{\partial^2}{\partial t^2} yZ3(z, t) \right) \\
& - 72 F(t) \tan(z) \left(\frac{d}{dt} F(t) \right) (\tan(z)^2 + 2) \left(\frac{\partial^2}{\partial t \partial z} yZ3(z, t) \right) + \left((-36 \tan(z)^3 \right. \\
& - 72 \tan(z)) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) + 2 F(t) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) + yZ3(z, t) (M^2 + F(t)^2 \\
& - 3 \frac{d}{dt} F(t) - 9) \Bigg) F(t) \left(\frac{d^2}{dt^2} F(t) \right) + 72 \tan(z) \left((\tan(z)^2 + 2) \left(\frac{d}{dt} F(t) \right)^2 \right. \\
& - F(t)^2 (\tan(z)^2 + 2) \left(\frac{d}{dt} F(t) \right) + ((-\tan(z)^2 - 2) F(t)^2 - 270 \tan(z)^6 \\
& - 594 \tan(z)^4 + (M^2 - 405) \tan(z)^2 + 2 M^2 - 90) F(t)^2 \Bigg) \left(\frac{\partial}{\partial z} yZ3(z, t) \right) \\
& + 2 F(t) \left(\frac{d}{dt} F(t) \right) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left(\frac{\partial}{\partial t} yZ3(z, t) \right) - \left(-2 \left(\frac{d}{dt} \right. \right. \\
& F(t) \Bigg)^3 + (2 M^2 + F(t)^2 - 18) \left(\frac{d}{dt} F(t) \right)^2 - 2 F(t)^2 (M^2 - F(t)^2 - 9) \left(\frac{d}{dt} F(t) \right) \\
& \left. \left. \left. + (F(t)^2 + (M + 3)^2) F(t)^2 (F(t)^2 + (M - 3)^2) \right) yZ3(z, t) \right) \right] \Bigg]
\end{aligned}$$

```

> t_end := Date( ) :
> elapsed := evalf(DateDifference(t_start, t_end, units = 's')) :
> myFileName := cat(tasks[1], "_took_", convert(elapsed, 'units', 'seconds')) :
myFileName := cat(myFileName, "_", StringTools:-FormatTime("%Y-%m-%d_%H-%M-%S"),
    ".m")
myFileName := "mmM4p_seq1__took_1.005000000*Unit(s)_2026-02-13_04-31-26.m" (24)

```

```

> save seq1, myFileName
> save seq1, "2026-02-13_mmM4p_seq1.m";
>

```

findme 2

```

> eq2;
nops(%);

```

$$\begin{aligned}
& [F(t) yZ4(z, t) + 3 yZ5(z, t) + M yZ7(z, t) + 6 \tan(z) D_1(yZ5)(z, t) = D_2(yZ4)(z, t), \\
& 3 yZ4(z, t) + M yZ6(z, t) + 6 \tan(z) D_1(yZ4)(z, t) = F(t) yZ5(z, t) + D_2(yZ5)(z, t), \\
& M yZ5(z, t) + F(t) yZ6(z, t) + 3 yZ7(z, t) + D_2(yZ6)(z, t) + 6 \tan(z) D_1(yZ7)(z, t) = 0,
\end{aligned}$$

$$M yZ4(z, t) + 3 yZ6(z, t) + D_2(yZ7)(z, t) + 6 \tan(z) D_1(yZ6)(z, t) = F(t) yZ7(z, t) \quad (25)$$

4

>

>

```
> #save seq2, cat("seq2_M4_MAX_", StringTools:-
    FormatTime("%Y-%m-%d_%H-%M-%S") , ".m");
```

>

```
> t_start := Date( ) :
```

```
> seq2 := simplify( subs( sC2, _c1 = C2, convert( pdsolve( eq2,
    zvars2), int, method = value ) ) )
assuming D(a4)(t) :: positive, M :: positive, Q1 :: positive, t
:: positive, z :: positive , a4(t) :: positive;
```

seq2 :=

$$yZ4(z, t) = \frac{1}{2 M F(t)} \left(-\frac{\partial^2}{\partial t^2} yZ7(z, t) + 36 \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) \tan(z)^2 \right) \quad (26)$$

$$+ (36 \tan(z)^3 + 72 \tan(z)) \left(\frac{\partial}{\partial z} yZ7(z, t) \right) + \left(\frac{d}{dt} F(t) \right) yZ7(z, t) + (-M^2 + F(t)^2$$

$$+9\,yZ7(z,t)\Big),yZ5(z,t)=$$

$$-\frac{1}{\sqrt{\sin(z)}\,M\,F(t)^2\cos(z)^5}\Bigg(\frac{1}{12}\Bigg(\cos(M\,t)\,e^{-\Big(\int F(t)\,dt\Big)}\Bigg(\frac{1}{F(t)^3}\Bigg(36\Bigg($$

$$-\frac{1}{36}\Bigg(\Bigg(\int-\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\Bigg(2\Bigg(\big(-18\,F(t)^2\cos(z)^3$$

$$+ 18 F(t)^2 \cos(z) \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ7(z, t) \right) - \frac{\cos(z)^3 F(t)^2 \left(\frac{\partial^4}{\partial t^4} yZ7(z, t) \right)}{2}$$

$$+ F(t) \cos(z)^3 \left(F(t)^2 + \frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) + 18 \sin(z) F(t)^2 (\cos(z))^2$$

$$+ 1) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ7(z, t) \right) + (36 F(t) \cos(z)^3 - 36 F(t) \cos(z)) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2}$$

$$yZ7(z,t)\Bigg)+\frac{\cos(z)^3\left(\frac{\mathrm{d}^3}{\mathrm{d}t^3}F(t)\right)F(t)^2yZ7(z,t)}{2}-\frac{1}{2}\left(\cos(z)^3\left(-\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}\right.\right.\right.$$

$$F(t)\Bigg)F(t)+2\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)^2-F(t)^2\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)+F(t)^2\left(M^2+F(t)^2-9\right)\left(\frac{\partial^2}{\partial t^2}\right.$$

$$yZ7(z,t)\Bigg)\Bigg)+18\cos(z)\left(\cos(z)-1\right)\left(\cos(z)+1\right)\left(\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)F(t)-2\left(\frac{\mathrm{d}}{\mathrm{d}t}\right.\right.$$

$$F(t)\Big)^2\Big)\left(\frac{\partial^2}{\partial z^2}yZ7(z,t)\right)-36\sin(z)\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)F(t)\left(\cos(z)^2+1\right)\left(\frac{\partial^2}{\partial t\partial z}yZ7(z,$$

$$t)\Big)+\frac{1}{2}\left(\left(2F(t)\left(\frac{\partial}{\partial t}yZ7(z,t)\right)\cos(z)^3+\left(-36\sin(z)\cos(z)^2\right.\right.\right.$$

$$\left.-36\sin(z)\right)\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+yZ7(z,t)\cos(z)^3\left(M^2-F(t)^2-3\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)$$

$$F\left(t\right)\left(\frac{{\mathrm{d}}^2}{{\mathrm{d} t}^2}F\left(t\right)\right)\right)+\left(\frac{{\mathrm{d}}}{{\mathrm{d} t} }F\left(t\right)\right)\left(F\left(t\right)\cos \left(z\right)^3\left(M^2-F\left(t\right)^2-\frac{{\mathrm{d}}}{{\mathrm{d} t} }F\left(t\right)-9\right)\left(\frac{\partial }{\partial t}\right.$$

$$yZ7\left(z,t\right)\right)-\left(\frac{{\mathrm{d}}}{{\mathrm{d} t} }F\left(t\right)\right)\left(\left(-36\sin \left(z\right)\cos \left(z\right)^2-36\sin \left(z\right)\right)\left(\frac{\partial }{\partial z}yZ7\left(z,t\right)\right)+yZ7\left(z,\right.$$

$$t\right)\cos \left(z\right)^3\left(M^2-\frac{{\mathrm{d}}}{{\mathrm{d} t} }F\left(t\right)-9\right)\right)\right)\right)\right)\mathrm{d} z\right)\cos \left(z\right)^5\right)+\left(-\frac{1}{18}\left[\left(\right.$$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 F(t) \cos(z)^3 - 36 F(t) \cos(z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right) \right.$$

$$\left. + \cos(z)^3 \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) F(t) - 2 \cos(z)^3 \left(F(t)^2 + \frac{\frac{d}{dt} F(t)}{2} \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \right.$$

$$\left. - 36 F(t) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right) + (-36 \cos(z)^3 + 36 \cos(z)) \left(\frac{d}{dt} \right. \right.$$

$$F(t) \Big) \left(\frac{\partial^2}{\partial z^2} \, yZ7(z,t) \right) - \cos(z)^3 \left(\frac{d^2}{dt^2} \, F(t) \right) F(t) \, yZ7(z,t) + F(t) \cos(z)^3 \left(M^2 \right.$$

$$+ F(t)^2 - \frac{d}{dt} \, F(t) - 9 \Big) \left(\frac{\partial}{\partial t} \, yZ7(z,t) \right) - \left(\frac{d}{dt} \, F(t) \right) \left(\left(-36 \sin(z) \cos(z)^2 \right. \right.$$

$$\left. \left. - 36 \sin(z) \right) \left(\frac{\partial}{\partial z} \, yZ7(z,t) \right) + yZ7(z,t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} \, F(t) - 9 \right) \right) \Big) \, dz \Big)$$

$$\cos(z)^5 \Big) - \frac{1}{36} \Big(\cos(z)^5 \Big(M^2 + F(t)^2 + \frac{\mathrm{d}}{\mathrm{d}t} F(t) \Big) \Big($$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \Big(\big(36 \cos(z)^3 - 36 \cos(z) \big) \Big(\frac{\partial^2}{\partial z^2} yZ7(z,t) \Big) + \Big(\frac{\partial^2}{\partial t^2} yZ7(z,$$

$$t) \Big) \cos(z)^3 + \big(-36 \sin(z) \cos(z)^2 - 36 \sin(z) \big) \Big(\frac{\partial}{\partial z} yZ7(z,t) \Big) + \Big(-2 F(t) \Big(\frac{\partial}{\partial t}$$

$$yZ7(z,t)\Big)+yZ7(z,t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\cos(z)^3\Big)\mathrm{d}z\Big)\Big)$$

$$+\sin(z)^{3/2}\left(\frac{\partial^3}{\partial t^2\partial z}yZ7(z,t)\right)\cos(z)^4-36\left(\frac{\partial^3}{\partial z^3}yZ7(z,t)\right)\sin(z)^{7/2}\cos(z)^2+\left(\right.$$

$$-2\left(\frac{\partial^2}{\partial t\partial z}yZ7(z,t)\right)F(t)+\left(\frac{\partial}{\partial z}yZ7(z,t)\right)\left(M^2-3F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-117\right)\Big)$$

$$\cos(z)^4 \sin(z)^3 \big|^2 - 198 \left(\frac{\partial}{\partial z} \, yZ7(z, t) \right) \sin(z)^7 \big|^2 \cos(z)^2 - 108 \sin(z)^{11} \big|^2 \left(\frac{\partial}{\partial z} \right.$$

$$yZ7(z, t) \Big) + \frac{1}{2} \left(\cos(z) \left(-324 \left(\frac{\partial^2}{\partial z^2} \, yZ7(z, t) \right) \sin(z)^5 \big|^2 \cos(z)^2 \right.$$

$$- 216 \sin(z)^9 \big|^2 \left(\frac{\partial^2}{\partial z^2} \, yZ7(z, t) \right) + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} \, yZ7(z, t) - 2 \, F(t) \left(\frac{\partial}{\partial t} \right. \right.$$

$$yZ7(z, t) \Big) + yZ7(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \Big) \Big) \Big) F(t)^2 \Big) \cos(M t) e^{\int F(t) dt}$$

$$\mathrm{d}t \Big) F(t)^2 \Big) - \frac{1}{12} \sin(M t) \mathrm{e}^{-\left(\int F(t) \, \mathrm{d}t\right)} \left[\int -\frac{1}{F(t)^3} \left[36 \sin(M t) \right] - \frac{1}{36} \right] \Bigg] \Bigg]$$

$$\int -\frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left(2 \left((-18 F(t)^2 \cos(z)^3 + 18 F(t)^2 \cos(z)) \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ7(z, \right. \right. \right.$$

$$t) \Big) - \frac{\cos(z)^3 F(t)^2 \left(\frac{\partial^4}{\partial t^4} yZ7(z, t) \right)}{2} + F(t) \cos(z)^3 \left(F(t)^2 + \frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t^3}$$

$$yZ7(z, t) \Big) + 18 \sin(z) F(t)^2 \left(\cos(z)^2 + 1 \right) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ7(z, t) \right) + \left(36 F(t) \cos(z)^3 \right.$$

$$\left. - 36 F(t) \cos(z) \right) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right)$$

$$+ \frac{\cos(z)^3 \left(\frac{d^3}{dt^3} F(t) \right) F(t)^2 yZ7(z, t)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \right.$$

$$\left. + 2 \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (M^2 + F(t)^2 - 9) \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \Bigg)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2} \right.$$

$$yZ7(z,t)\Big)-36\sin(z)\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)F(t)\left(\cos(z)^2+1\right)\left(\frac{\partial^2}{\partial t\partial z}yZ7(z,t)\right)$$

$$+\frac{1}{2}\left(\left(2F(t)\left(\frac{\partial}{\partial t}yZ7(z,t)\right)\cos(z)^3+\left(-36\sin(z)\cos(z)^2-36\sin(z)\right)\left(\frac{\partial}{\partial z}\right.\right.\right.$$

$$\left.\left.yZ7(z,t)\right)+yZ7(z,t)\cos(z)^3\left(M^2-F(t)^2-3\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\right)F(t)\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)\Big)$$

$$+ \left(\frac{d}{dt} F(t) \right) \left(F(t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left(\frac{\partial}{\partial t} yZ7(z, t) \right) - \left(\frac{d}{dt} \right.$$

$$F(t) \bigg) \left((-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} yZ7(z, t) \right) + yZ7(z, t) \cos(z)^3 \left(M^2 \right. \right.$$

$$-\frac{d}{dt} F(t) - 9 \Big) \Big) \Big) \Big) \Big) dz \Big) \cos(z)^5 \Big) + \left(-\frac{1}{18} \left(\left(\right.$$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 F(t) \cos(z)^3 - 36 F(t) \cos(z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right) \right.$$

$$\left. + \cos(z)^3 \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) F(t) - 2 \cos(z)^3 \left(F(t)^2 + \frac{\frac{d}{dt} F(t)}{2} \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \right.$$

$$\left. - 36 F(t) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right) + (-36 \cos(z)^3 + 36 \cos(z)) \left(\frac{d}{dt} \right. \right.$$

$$F(t) \Big) \left(\frac{\partial^2}{\partial z^2} yZ7(z,t) \right) - \cos(z)^3 \left(\frac{d^2}{dt^2} F(t) \right) F(t) yZ7(z,t) + F(t) \cos(z)^3 \left(M^2 \right.$$

$$+ F(t)^2 - \frac{d}{dt} F(t) - 9 \Big) \left(\frac{\partial}{\partial t} yZ7(z,t) \right) - \left(\frac{d}{dt} F(t) \right) \left((-36 \sin(z) \cos(z)^2 \right.$$

$$- 36 \sin(z) \Big) \left(\frac{\partial}{\partial z} yZ7(z,t) \right) + yZ7(z,t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) dz \Big)$$

$$\cos(z)^5\Big)-\frac{1}{36}\left(\cos(z)^5\left(M^2+F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\right.\right.$$

$$\int\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36\cos(z)^3-36\cos(z))\left(\frac{\partial^2}{\partial z^2}yZ7(z,t)\right)+\left(\frac{\partial^2}{\partial t^2}yZ7(z,\right.\right.$$

$$t)\cos(z)^3+(-36\sin(z)\cos(z)^2-36\sin(z))\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+\left(-2F(t)\left(\frac{\partial}{\partial t}\right.\right.$$

$$yZ7(z,t)\Big)+yZ7(z,t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\cos(z)^3\Big)\mathrm{d}z\Big)\Big)$$

$$+\sin(z)^{3/2}\left(\frac{\partial^3}{\partial t^2\partial z}yZ7(z,t)\right)\cos(z)^4-36\left(\frac{\partial^3}{\partial z^3}yZ7(z,t)\right)\sin(z)^{7/2}\cos(z)^2+\left(\right.$$

$$-2\left(\frac{\partial^2}{\partial t\partial z}yZ7(z,t)\right)F(t)+\left(\frac{\partial}{\partial z}yZ7(z,t)\right)\left(M^2-3F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-117\right)\Big)$$

$$\cos(z)^4 \sin(z)^3 \big|^2 - 198 \left(\frac{\partial}{\partial z} \, yZ7(z, t) \right) \sin(z)^7 \big|^2 \cos(z)^2 - 108 \sin(z)^{11} \big|^2 \left(\frac{\partial}{\partial z} \right.$$

$$yZ7(z, t) \Big) + \frac{1}{2} \left(\cos(z) \left(-324 \left(\frac{\partial^2}{\partial z^2} \, yZ7(z, t) \right) \sin(z)^5 \big|^2 \cos(z)^2 \right.$$

$$- 216 \sin(z)^9 \big|^2 \left(\frac{\partial^2}{\partial z^2} \, yZ7(z, t) \right) + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} \, yZ7(z, t) - 2 \, F(t) \left(\frac{\partial}{\partial t} \right. \right.$$

$$yZ7(z, t) \Big) + yZ7(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \Big) \Big) \Big) F(t)^2 \Big) e^{\int F(t) dt} \Big) dt \Big)$$

$$F(t)^2 + \cos(z)^4 \left(\frac{1}{24} \left(\cos(z) \left(\int -\frac{1}{\sqrt{\sin(z)} (\cos(2z) + 1)} \left(3 \left(-\cos(z) \right) \right) \right) \right) \right)$$

$$+ \frac{\cos(3z)}{3} \Big) F(t) \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) + 12 F(t) (\cos(z) - \cos(3z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right)$$

$$+ \left(2 F(t)^2 + \frac{\mathrm{d}}{\mathrm{d} t} F(t) \right) \left(\cos(z) + \frac{\cos(3 z)}{3} \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) + 12 F(t) (\sin(3 z)$$

$$+ 5 \sin(z)) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right) - 12 \left(\frac{\mathrm{d}}{\mathrm{d} t} F(t) \right) (\cos(z) - \cos(3 z)) \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right)$$

$$+ F(t) yZ7(z, t) \left(\cos(z) + \frac{\cos(3 z)}{3} \right) \left(\frac{\mathrm{d}^2}{\mathrm{d} t^2} F(t) \right) + \left($$

$$-\frac{F(t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\left(\frac{\partial}{\partial t}yZ7(z,t)\right)}{3}$$

$$+\frac{yZ7(z,t)\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)}{3}\cos(3z)-F(t)\cos(z)\left(M^2\right.$$

$$\left.+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\left(\frac{\partial}{\partial t}yZ7(z,t)\right)+\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left((-12\sin(3z)\right.$$

$$-60\sin(z)\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+\cos(z)yZ7(z,t)\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)\Big)\Big)$$

$$\mathrm{d}z\Big)\Big)+F(t)^2\left(\frac{1}{24}\left(\cos(z)\left(\int\frac{1}{\sqrt{\sin(z)}\left(\cos(2z)+1\right)}\right.\right.\right.\right.$$

$$+\frac{\cos(3z)}{3}\Big)\left(\frac{\partial^2}{\partial t^2}yZ7(z,t)\right)+(-12\cos(z)+12\cos(3z))\left(\frac{\partial^2}{\partial z^2}yZ7(z,t)\right)+\left(\right.$$

$$-\frac{2\,F(t)\left(\frac{\partial}{\partial t}\,yZ7(z,t)\right)}{3}+\frac{yZ7(z,t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)-9\right)}{3}\Bigg)\cos(3\,z)$$

$$-2\,F(t)\left(\frac{\partial}{\partial t}\,yZ7(z,t)\right)\cos(z)+\left(-12\sin(3\,z)-60\sin(z)\right)\left(\frac{\partial}{\partial z}\,yZ7(z,t)\right)$$

$$+\cos(z)\,yZ7(z,t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)-9\right)\Bigg)\mathrm{d}z\Bigg)+M\cos(z)\left(\cos(M\,t)\,c22\right.$$

$$-c2l\sin(Mt))\,e^{-\left(\int F(t)\,dt\right)}+3\,yZ7(z,t)\,\sqrt{\sin(z)}\,\cos(z)+6\left(\frac{\partial}{\partial z}\,yZ7(z,\right.$$

$$t)\left.\left.\left.\sin(z)^{3/2}\right)\right)\right),yZ6(z,t)$$

$$=\frac{1}{\sqrt{\sin(z)}\,F(t)\,M\cos(z)^5}\left(\frac{1}{12}\left(\sin(Mt)\,e^{-\left(\int F(t)\,dt\right)}\left(\int\frac{1}{F(t)^3}\right)\frac{1}{36}\left(-\frac{1}{36}\left(\left(\int\frac{1}{F(t)^3}\right)\left(\int\frac{1}{F(t)^3}\right)\right)\right)\right)\right)$$

$$\int -\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left(2\left((-18F(t)^2\cos(z)^3+18F(t)^2\cos(z)\right)\left(\frac{\partial^4}{\partial t^2\partial z^2}yZ7(z,\right.\right.$$

$$\left.t\right)-\frac{\cos(z)^3F(t)^2\left(\frac{\partial^4}{\partial t^4}yZ7(z,t)\right)}{2}+F(t)\cos(z)^3\left(F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\frac{\partial^3}{\partial t^3}\right.$$

$$\left.yZ7(z,t)\right)+18\sin(z)F(t)^2\left(\cos(z)^2+1\right)\left(\frac{\partial^3}{\partial t^2\partial z}yZ7(z,t)\right)+(36F(t)\cos(z)^3$$

$$-36\,F(t)\,\cos(z))\left(\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)\right)\left(\frac{\partial^3}{\partial t\partial z^2}\,yZ7(z,t)\right)$$

$$+\frac{\cos(z)^3\left(\frac{\mathrm{d}^3}{\mathrm{d}t^3}\,F(t)\right)F(t)^2\,yZ7(z,t)}{2}-\frac{1}{2}\left(\cos(z)^3\left(-\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}\,F(t)\right)F(t)\right.\right.$$

$$\left.\left.+2\left(\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)\right)^2-F(t)^2\left(\frac{\mathrm{d}}{\mathrm{d}t}\,F(t)\right)+F(t)^2\left(M^2+F(t)^2-9\right)\right)\left(\frac{\partial^2}{\partial t^2}\,yZ7(z,t)\right)\right)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

$$yZ7(z, t) \Big) - 36 \sin(z) \left(\frac{d}{dt} F(t) \right) F(t) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right)$$

$$+ \frac{1}{2} \left(\left(2 F(t) \left(\frac{\partial}{\partial t} yZ7(z, t) \right) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \left(\frac{\partial}{\partial z} \right. \right. \right.$$

$$yZ7(z,t)\Big)+yZ7(z,t)\cos(z)^3\left(M^2-F(t)^2-3\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)F(t)\left(\frac{\mathrm{d}^2}{\mathrm{d}t^2}F(t)\right)\Big)$$

$$+\left(\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(F(t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\left(\frac{\partial}{\partial t}yZ7(z,t)\right)-\left(\frac{\mathrm{d}}{\mathrm{d}t}\right.\right.$$

$$F(t)\Big)\left(\left(-36\sin(z)\cos(z)^2-36\sin(z)\right)\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+yZ7(z,t)\cos(z)^3\left(M^2\right.\right.$$

$$\left| -\frac{d}{dt} F(t-9) \right) \right) \right) \right) \right) \right) dz \cos(z)^5 \Bigg) + \left| -\frac{1}{18} \right|$$

$$\left[\frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 F(t) \cos(z))^3 - 36 F(t) \cos(z) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right) \right]$$

$$+ \cos(z)^3 \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) F(t) - 2 \cos(z)^3 \left(F(t)^2 + \frac{\frac{d}{dt} F(t)}{2} \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right)$$

$$- 36 \, F(t) \sin(z) \left(\cos(z)^2 + 1\right) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t)\right) + \left(-36 \cos(z)^3 + 36 \cos(z)\right) \left(\frac{d}{dt}\right.$$

$$F(t) \left.\left(\frac{\partial^2}{\partial z^2} yZ7(z, t)\right) - \cos(z)^3 \left(\frac{d^2}{dt^2} F(t)\right) F(t) yZ7(z, t) + F(t) \cos(z)^3 \left(M^2\right.\right.$$

$$\left.+ F(t)^2 - \frac{d}{dt} F(t) - 9\right) \left(\frac{\partial}{\partial t} yZ7(z, t)\right) - \left(\frac{d}{dt} F(t)\right) \left(\left(-36 \sin(z) \cos(z)^2\right.\right.$$

$$-36\sin(z)\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+yZ7(z,t)\cos(z)^3\left(M^2-F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\right)\mathrm{d}z\Bigg)$$

$$\cos(z)^5\Bigg)-\frac{1}{36}\left(\cos(z)^5\left(M^2+F(t)^2+\frac{\mathrm{d}}{\mathrm{d}t}F(t)\right)\left(\right.\right.$$

$$\int\frac{1}{\sqrt{\sin(z)}\cos(z)^2}\left((36\cos(z)^3-36\cos(z))\left(\frac{\partial^2}{\partial z^2}yZ7(z,t)\right)+\left(\frac{\partial^2}{\partial t^2}yZ7(z,\right.\right.$$

$$t)\Big)\cos(z)^3+\big(-36\sin(z)\cos(z)^2-36\sin(z)\big)\left(\frac{\partial}{\partial z}yZ7(z,t)\right)+\left(-2F(t)\left(\frac{\partial}{\partial t}\right.\right.$$

$$\left.yZ7(z,t)\right)+yZ7(z,t)\left(M^2+F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-9\right)\Big)\cos(z)^3\Big)\mathrm{d}z\Big)\Big)$$

$$+\sin(z)^{3\mid 2}\left(\frac{\partial^3}{\partial t^2\partial z}yZ7(z,t)\right)\cos(z)^4-36\left(\frac{\partial^3}{\partial z^3}yZ7(z,t)\right)\sin(z)^{7\mid 2}\cos(z)^2+\left(\right.$$

$$-2\left(\frac{\partial^2}{\partial t\partial z}yZ7(z,t)\right)F(t)+\left(\frac{\partial}{\partial z}yZ7(z,t)\right)\left(M^2-3F(t)^2-\frac{\mathrm{d}}{\mathrm{d}t}F(t)-117\right)\right)$$

$$\cos(z)^4\sin(z)^{3\mid 2}-198\left(\frac{\partial}{\partial z}yZ7(z,t)\right)\sin(z)^{7\mid 2}\cos(z)^2-108\sin(z)^{11\mid 2}\left(\frac{\partial}{\partial z}\right.$$

$$yZ7(z,t)\Big)+\frac{1}{2}\Bigg(\cos(z)\left(-324\left(\frac{\partial^2}{\partial z^2}yZ7(z,t)\right)\sin(z)^{5\mid 2}\cos(z)^2\right.$$

$$-216 \sin(z)^9 / 2 \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) - 2 F(t) \left(\frac{\partial}{\partial t} \right. \right.$$

$$yZ7(z, t) \Big) + yZ7(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \Big) \Big) \Big) F(t)^2 \Big) \cos(M t) e^{\int F(t) dt}$$

$$\mathrm{d}t \Big) F(t) \Big) + \frac{1}{12} \cos(Mt) \mathrm{e}^{-\left(\int F(t) \, \mathrm{d}t\right)} \left[-\frac{1}{F(t)^3} \left[36 \sin(Mt) \left[-\frac{1}{36} \left(\left(\int \right) \right) \right] \right] \right]$$

$$-\frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left(2 \left((-18 F(t)^2 \cos(z)^3 + 18 F(t)^2 \cos(z)) \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ7(z, \right. \right. \right.$$

$$t) \Big) - \frac{\cos(z)^3 F(t)^2 \left(\frac{\partial^4}{\partial t^4} yZ7(z, t) \right)}{2} + F(t) \cos(z)^3 \left(F(t)^2 + \frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t^3}$$

$$yZ7(z, t) \Big) + 18 \sin(z) F(t)^2 (\cos(z)^2 + 1) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ7(z, t) \right) + (36 F(t) \cos(z)^3$$

$$- 36 F(t) \cos(z)) \left(\frac{d}{dt} F(t) \right) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right)$$

$$+ \frac{\cos(z)^3 \left(\frac{d^3}{dt^3} F(t) \right) F(t)^2 yZ7(z, t)}{2} - \frac{1}{2} \left(\cos(z)^3 \left(- \left(\frac{d^2}{dt^2} F(t) \right) F(t) \right.$$

$$\left. + 2 \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (M^2 + F(t)^2 - 9) \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \Big)$$

$$+ 18 \cos(z) (\cos(z) - 1) (\cos(z) + 1) \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) - 2 \left(\frac{d}{dt} F(t) \right)^2 \right) \left(\frac{\partial^2}{\partial z^2}$$

[illegible]

$$\begin{aligned}
& \int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \left((36 F(t) \cos(z)^3 - 36 F(t) \cos(z)) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right) \right. \\
& + \cos(z)^3 \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) F(t) - 2 \cos(z)^3 \left(F(t)^2 + \frac{\frac{d}{dt} F(t)}{2} \right) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \\
& - 36 F(t) \sin(z) (\cos(z)^2 + 1) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right) + (-36 \cos(z)^3 + 36 \cos(z)) \left(\frac{d}{dt} \right. \\
& F(t) \left. \right) \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) - \cos(z)^3 \left(\frac{d^2}{dt^2} F(t) \right) F(t) yZ7(z, t) + F(t) \cos(z)^3 \left(M^2 \right. \\
& + F(t)^2 - \frac{d}{dt} F(t) - 9 \left. \right) \left(\frac{\partial}{\partial t} yZ7(z, t) \right) - \left(\frac{d}{dt} F(t) \right) \left((-36 \sin(z) \cos(z)^2 \right. \\
& - 36 \sin(z)) \left(\frac{\partial}{\partial z} yZ7(z, t) \right) + yZ7(z, t) \cos(z)^3 \left(M^2 - F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \left. \right) \Big) dz
\end{aligned}$$

$$\cos(z)^5 \Big) - \frac{1}{36} \Bigg(\cos(z)^5 \Big(M^2 + F(t)^2 + \frac{\mathrm{d}}{\mathrm{d}t} F(t) \Big) \Big($$

$$\int \frac{1}{\sqrt{\sin(z)} \cos(z)^2} \Big((36 \cos(z)^3 - 36 \cos(z)) \Big(\frac{\partial^2}{\partial z^2} yZ7(z, t) \Big) + \Big(\frac{\partial^2}{\partial t^2} yZ7(z,$$

$$t) \Big) \cos(z)^3 + (-36 \sin(z) \cos(z)^2 - 36 \sin(z)) \Big(\frac{\partial}{\partial z} yZ7(z, t) \Big) + \Big(-2 F(t) \Big(\frac{\partial}{\partial t}$$

$$yZ7(z, t) \Big) + yZ7(z, t) \Big(M^2 + F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 9 \Big) \Big) \cos(z)^3 \Big) \mathrm{d}z \Bigg) \Bigg)$$

$$+ \sin(z)^{3/2} \Big(\frac{\partial^3}{\partial t^2 \partial z} yZ7(z, t) \Big) \cos(z)^4 - 36 \Big(\frac{\partial^3}{\partial z^3} yZ7(z, t) \Big) \sin(z)^{7/2} \cos(z)^2 + \Big($$

$$-2 \Big(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \Big) F(t) + \Big(\frac{\partial}{\partial z} yZ7(z, t) \Big) \Big(M^2 - 3 F(t)^2 - \frac{\mathrm{d}}{\mathrm{d}t} F(t) - 117 \Big) \Bigg)$$

$$\cos(z)^4 \sin(z)^{3/2} - 198 \left(\frac{\partial}{\partial z} yZ7(z, t) \right) \sin(z)^{7/2} \cos(z)^2 - 108 \sin(z)^{11/2} \left(\frac{\partial}{\partial z} \right.$$

$$yZ7(z, t) \Big) + \frac{1}{2} \left(\cos(z) \left(-324 \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) \sin(z)^{5/2} \cos(z)^2 \right.$$

$$- 216 \sin(z)^{9/2} \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) + \cos(z)^4 \sqrt{\sin(z)} \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) - 2 F(t) \left(\frac{\partial}{\partial t} \right.$$

$$yZ7(z, t) \Big) + yZ7(z, t) \left(M^2 - 3 F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Big) \Big) \Big) F(t)^2 \Big) e^{\int F(t) dt} \Big) dt \Big) F(t) \Big)$$

$$+ M \left(\frac{1}{24} \left(\int \frac{1}{\sqrt{\sin(z)} (\cos(2z) + 1)} \left(3 \left(\left(\cos(z) + \frac{\cos(3z)}{3} \right) \left(\frac{\partial^2}{\partial t^2} \right. \right. \right. \right.$$

$$yZ7(z, t) \Big) + (-12 \cos(z) + 12 \cos(3z)) \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) + \left(\right.$$

$$- \frac{2 F(t) \left(\frac{\partial}{\partial t} yZ7(z, t) \right)}{3} + \frac{yZ7(z, t) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right)}{3} \Big) \cos(3z)$$

$$\begin{aligned}
& - 2 F(t) \left(\frac{\partial}{\partial t} yZ7(z, t) \right) \cos(z) + (-12 \sin(3z) - 60 \sin(z)) \left(\frac{\partial}{\partial z} yZ7(z, t) \right) \\
& + \cos(z) yZ7(z, t) \left(M^2 + F(t)^2 - \frac{d}{dt} F(t) - 9 \right) \Bigg) dz \\
& + e^{-\left(\int F(t) dt\right)} F(t) (c2I \cos(Mt) + \sin(Mt) c22) \cos(z)^5 \Bigg) \Bigg], \left[\frac{\partial^4}{\partial t^4} yZ7(z, t) \right. \\
& = \frac{1}{F(t)^2} \left(72 \tan(z)^2 F(t)^2 \left(\frac{\partial^4}{\partial t^2 \partial z^2} yZ7(z, t) \right) - 1296 \tan(z)^4 F(t)^2 \left(\frac{\partial^4}{\partial z^4} yZ7(z, t) \right) \right. \\
& + 72 F(t)^2 \tan(z) (\tan(z)^2 + 2) \left(\frac{\partial^3}{\partial t^2 \partial z} yZ7(z, t) \right) - 7776 (\tan(z)^2 \\
& + \frac{4}{3}) F(t)^2 \tan(z)^3 \left(\frac{\partial^3}{\partial z^3} yZ7(z, t) \right) + 2 \left(\frac{d}{dt} F(t) \right) F(t) \left(\frac{\partial^3}{\partial t^3} yZ7(z, t) \right) - 72 \left(\frac{d}{dt} \right. \\
& F(t) \left. \right) \tan(z)^2 F(t) \left(\frac{\partial^3}{\partial t \partial z^2} yZ7(z, t) \right) + F(t)^2 yZ7(z, t) \left(\frac{d^3}{dt^3} F(t) \right) + 72 \left(\right. \\
& - \frac{\left(\frac{d^2}{dt^2} F(t) \right) F(t)}{2} + \left(\frac{d}{dt} F(t) \right)^2 - F(t)^2 \left(\frac{d}{dt} F(t) \right) + F(t)^2 (-270 \tan(z)^4 + M^2 \\
& - F(t)^2 - 504 \tan(z)^2 - 261) \Bigg) \tan(z)^2 \left(\frac{\partial^2}{\partial z^2} yZ7(z, t) \right) + \left(\left(\frac{d^2}{dt^2} F(t) \right) F(t) \right. \\
& - 2 \left(\frac{d}{dt} F(t) \right)^2 + 2 F(t)^2 \left(\frac{d}{dt} F(t) \right) - 2 F(t)^2 (M^2 - F(t)^2 - 9) \Bigg) \left(\frac{\partial^2}{\partial t^2} yZ7(z, t) \right) \\
& - 72 F(t) \tan(z) \left(\frac{d}{dt} F(t) \right) (\tan(z)^2 + 2) \left(\frac{\partial^2}{\partial t \partial z} yZ7(z, t) \right) + \left((-36 \tan(z)^3 \right.
\end{aligned}$$


```

> t_end := Date( ) :
> elapsed := evalf( DateDifference(t_start, t_end, units = 's') ) :
> myFileName := cat(tasks[2], "_took_", convert(elapsed, 'units', 'seconds')) :
myFileName := cat(myFileName, "_", StringTools:-FormatTime("%Y-%m-%d_%H-%M-%S"),
    ".m")
myFileName := "mmM4p_seq2_took_1.005000000*Unit(s)_2026-02-13_04-29-57.m" (27)

```

```

>
>
> nops(seq2);
>
> nops(seq2[1]);
> nops(seq2[1][3]);
> seq2[1][3][1];

```



➤

findme 11

```
>  
> seq11 := simplify( convert( sqe1[1], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq11, "7950X_seq11.m";
```

findme 12

```
>  
> seq12 := simplify( convert( sqe1[2], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq12, "7950X_seq12.m";
```

findme 13

```
>  
> seq13 := simplify( convert( sqe1[3], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq13, "7950X_seq13.m";
```

findme 14

```
>  
> seq14 := simplify( convert( sqe1[4], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq14, "7950X_seq14.m";  
>
```

```
1 #seq2 := (simplify(pdsolve(eq2, zvars2)) assuming (D(a4)(t)::positive, M::positive, t::positive, z::positive, a4(t)::  
positive))
```

findme 21

```
>  
>  
> seq21 := simplify( convert( sqe2[1], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq21, "7950X_seq21.m";
```

findme 22

```
>  
> seq22 := simplify( convert( sqe2[2], int, method = value ) ) assuming Q1  
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z  
:: positive , a4(t) :: positive;  
> save seq22, "7950X_seq22.m";
```

findme 23

```

>
> seq23 := simplify( convert( sqe2[3], int, method = value ) ) assuming Q1
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z
:: positive, a4(t) :: positive;

```

```

> save seq23, "7950X_seq23.m";

```

```

findme 24

```

```

>
> seq24 := simplify( convert( sqe2[4], int, method = value ) ) assuming Q1
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z
:: positive, a4(t) :: positive;

```

```

> save seq24, "7950X_seq24.m";

```

```

findme 666

```

```

1 #####afterseq1:= (simplify(pdsolve(eq1Q1, zvars1)) assuming (D(a4)(t)::positive, M::positive, t::positive, z::positive
, a4(t)::positive));

```

```

> s22800 := simplify( pdsolve( eq228, zvars228 ) ) assuming D(a4)(t)
:: positive, M :: positive, t :: positive, z :: positive, a4(t)
:: positive;

```

```

> s22800[1];

```

```

> s22800[2];

```

```

> s22800[3];

```

```

> s22800[4];

```

```

> difference := simplify( subs(s22800, yZ9(z, t) - yZ10(z, t) ) ) assuming D(a4)(t)
:: positive, M :: positive, t :: positive, z :: positive, a4(t)
:: positive;

```

```

> simplify( subs( -c1 =  $\frac{M^2}{72}$  , s22800 ) ) assuming c228 :: positive, D(a4)(t)
:: positive, M :: positive, t :: positive, z :: positive , a4(t)
:: positive;

> simplify(pdetest(s22800, eq228)) assuming D(a4)(t) :: positive, M :: positive,
t :: positive, z :: positive , a4(t) :: positive;

> s228 := simplify( subs( sC2,  $M^2 - 36\_c1 = (c228)^2$  ,  $\_c1 = \frac{(M^2 - (c228)^2)}{36}$  ,
s22800 ) ) assuming c228 :: positive, D(a4)(t) :: positive, M
:: positive, t :: positive, z :: positive , a4(t) :: positive;

s228[1];

s228[2];

s228[3];

s228[4];

pdtest

> seq2Q1A := simplify( convert( seq2Q1 , int, method = value ) ) assuming C2Q1
:: positive, D(a4)(t) :: positive, M :: positive, t :: positive, z
:: positive , a4(t) :: positive;

> simplify( subs(  $\sqrt{-C2Q1^2 + M^2} = 6\ ez9$  , seq2Q1A ) ) assuming ez9
:: positive, C2Q1 :: positive, D(a4)(t) :: positive, M :: positive, t
:: positive, z :: positive , a4(t) :: positive;
seq2Q1B := simplify( subs(  $\frac{1}{\sqrt{-C2Q1^2 + M^2}} = \frac{1}{6\ ezp}$  , % ) ) assuming ez9
:: positive, C2Q1 :: positive, D(a4)(t) :: positive, M :: positive, t
:: positive, z :: positive , a4(t) :: positive;

```

```

> seq2Q1B[1];
> seq2Q1B[2];
> seq2Q1B[3];
>
> seq2Q1B[4];
simplify( % ) assuming ez9 :: positive, C2Q1 :: positive, D(a4)(t)
:: positive, M :: positive, t :: positive, z :: positive , a4(t)
:: positive;
>
>
>
>
>
>
> tseq2Q1 := simplify( subs(t = 0, seq2Q1B ) ) assuming C2Q1 :: positive,
D(a4)(t) :: positive, M :: positive, t :: positive, z :: positive ,
a4(t) :: positive;
>
>
> tseq2Q1[1];
> tseq2Q1[2];
>
>
> tseq2Q1[3];
>
>
> tseq2Q1[4];
>
>
>
> zseq2Q1 := simplify( subs(z = 0, seq2Q1A ) ) assuming C2Q1 :: positive,
D(a4)(t) :: positive, M :: positive, t :: positive, z :: positive ,
a4(t) :: positive;
>
>
>
>
>
>
> tzseq2Q1 := simplify( subs(t = 0, z = 0, seq2Q1A ) ) assuming C2Q1 :: positive,
D(a4)(t) :: positive, M :: positive, t :: positive, z :: positive ,
a4(t) :: positive;
>
>
>
>
>
>
> seq2Q1[1];
>
>
> seq2Q1[2];
>
>
>
>
> # convert( seq2Q1 , int, method = value )

```

[>

```
1 ###seq1Q1 := (simplify(pdsolve(eq1Q1, zvars1)) assuming (D(a4)(t)::positive, M::positive, t::positive, z::positive,
a4(t)::positive));
```

[>

[>

```
> seq1Q1 := simplify(      convert( pdsolve( eq1Q1, zvars1) ,int, method
= value )                ) assuming  D(a4)(t) :: positive, M :: positive, t
:: positive,  z :: positive ,  a4(t) :: positive;
```

[>

[>

[>

[>

[>

[>