```
(*Clear previous variables*)
Clear[x, y, y1, y2, v1, v2, w, f, yh, yc, yp, sol]
(*Define the equations*)
eq1 = y''[x] + x*y'[x] + y[x] == 3*x^2 + 2;
(*Nonhomogeneous*)eq0 = y''[x] + x*y'[x] + y[x] == 0;
(*Homogeneous*)f[x_] = 3*x^2 + 2;(*RHS function*)
Print["Nonhomogeneous eq: ", eq1];
Print["Homogeneous eq: ", eq0];
Print["RHS function f(x): ", f[x]];
(*Solve homogeneous equation*)
yh = DSolve[eq0, y[x], x][[1]];
Print["Homogeneous solution yh: ", yh];
(*Define two independent solutions*)
y1[x_] = y[x] /. yh /. {C[1] → 1, C[2] → 0};
y2[x_] = y[x] /. yh /. {C[1] → 0, C[2] → 1};
Print["Independent solution y1(x): ", y1[x]];
Print["Independent solution y2(x): ", y2[x]];
(*Wronskian*)
w = Det[{{y1[x], y2[x]}, {y1'[x], y2'[x]}}];
Print["Wronskian w(x): ", w];
(*Variation of parameters:compute v1 and v2*)
v1 = -Integrate[y2[x]*f[x]/w, x];
v2 = Integrate[y1[x]*f[x]/w, x];
Print["v1(x) = ", v1];
Print["v2(x) = ", v2];
(*Particular solution*)
yp = v1*y1[x] + v2*y2[x];
Print["Particular solution yp(x): ", yp];
(*Complementary (homogeneous) solution*)
yc = y[x] /. yh;
Print["Complementary solution yc(x): ", yc];
(*General solution*)
sol[x_] = Simplify[yc + yp];
Print["General solution sol(x): ", sol[x]];
```