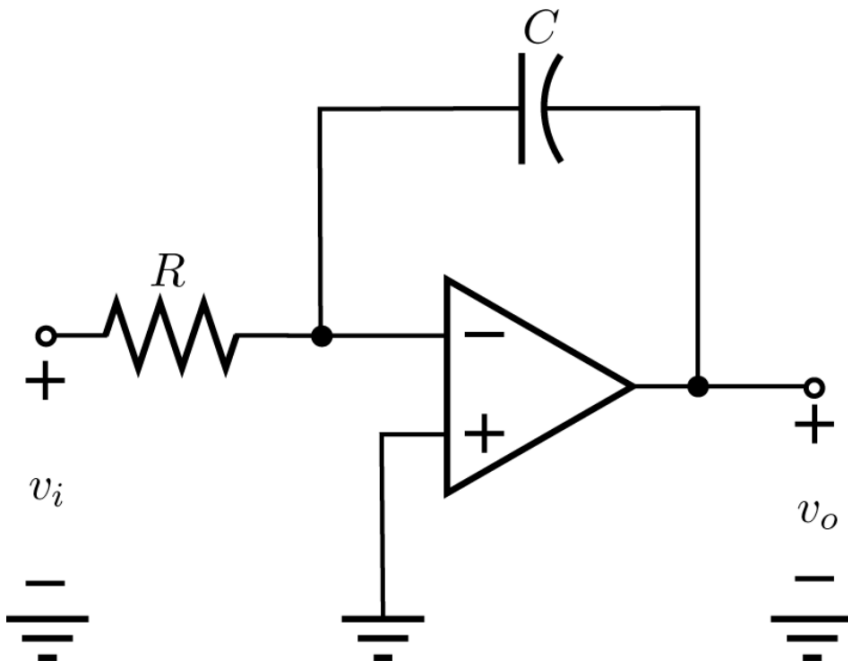# Problem 2.4.1

For the circuit above, $R = 4\text{M}\Omega$ and $C = 0.75\,\mu\text{F}$. $v_i(t) = -t^2\text{V}$ for $s \le t \le 5\text{s}$. What is the value of v_o at time $t = 5\text{s}$, if $v_o(0) = 0$? You can assume the operational amplifier behaves as an ideal op amp with power supplies of $+15\text{V}$ and -15V.

```
syms vin(t) vo(t)
C = 0.75e-6;
R = 4e6;
ode = diff(vin, t) == -t^2; % definition of a differential equation
cond = vin(0) == 0;
% Compute analytic solution of a symbolic equation
vinSol(t) = dsolve(ode,cond);
```

vinSol(t) =

$$-\frac{t^3}{3}$$

```
% Compute analytic solution of a symbolic equation
vo(t) = (-1/(R*C))*vinSol
```

vo(t) =

$$\frac{t^3}{9}$$

```
vo(5)
```

ans =

$$\frac{125}{9}$$