Problem 1 -

If \( v_d(t) = \sin(t) \), find \( v_d(t) \) and plot both waveforms. Assume the diode is ideal. Draw the equivalent circuits and indicate when they are valid. Plot \( V_s \) and \( V_o \) on the same graph with \( V_s \) as a solid line and \( V_o \) as a dashed line.

\[
T = \frac{1}{f} \quad f = \frac{\omega}{2\pi} = \frac{1}{2\pi} \quad T = 2\pi \quad \omega = \omega_0
\]

**When \( V_s > 0 \)**

\[
V_o = \frac{R}{R + 2R} V_s = \frac{R}{3R} V_s = \frac{1}{3} V_s = \frac{1}{3} \sin(t)
\]

**When \( V_s < 0 \)**

\[
V_o = \frac{2R}{R + 2R} V_s = \frac{2R}{3R} V_s = \frac{2}{3} V_s = \frac{2}{3} \sin(t)
\]

Another problem on the back side
Problem 2

For the signal \( v(t) = 2 + 3 \cos(2\pi t) + 50 \sin(10\pi t) + 0.2 \cos(200\pi t + \frac{\pi}{4}) \), make a graph of the frequency spectrum.