

8. True or false? Write out the full word “true” or “false” and provide a brief justification (2 points each).

(a) Variation of parameters is applicable to find a solution of $y'' + \sin(y) = \tan(t)$.

(b) The function $f(t) = e^{\sqrt{t}}$ has a Laplace transform.

(c) There is a piecewise-continuous function of exponential order having Laplace transform $F(s) = \frac{s-1}{s+1}$ for $s > -1$.

(d) An unforced mechanical system described by the ODE $2y'' + y' + 2y = 0$ is underdamped.

(e) A sinusoidally-forced mechanical system described by the ODE $2y'' + y' + 2y = F_0 \cos(\Omega t)$ has a steady state sinusoidal solution with an amplitude that can be an arbitrarily large multiple of $|F_0|$ if Ω is chosen appropriately.