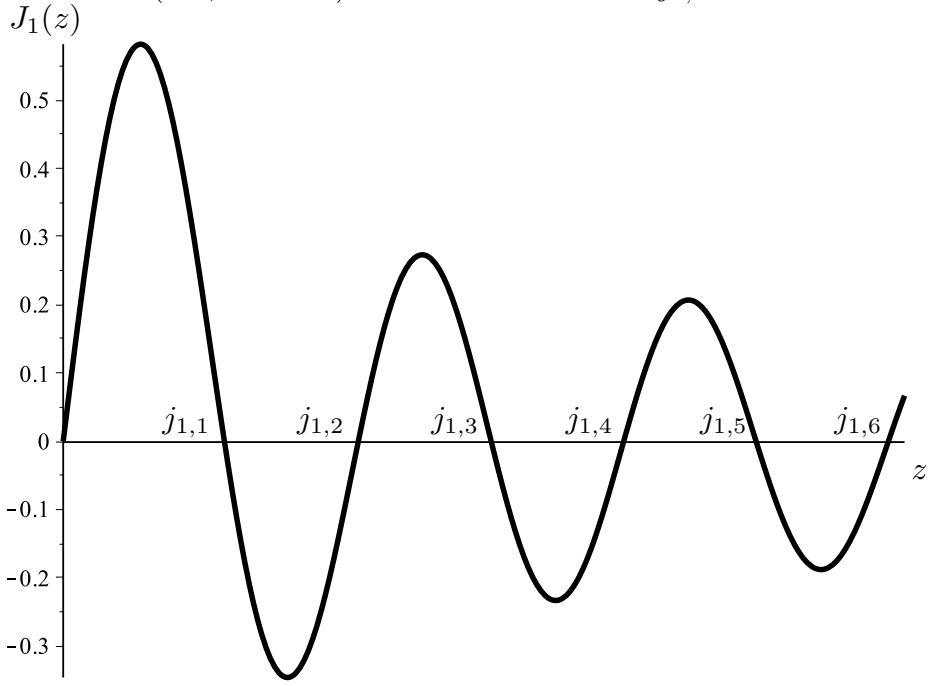
Bessel Functions

Two linearly independent solutions to the Bessel equation of order ν

$$z^2\frac{d^2y}{dz^2} + z\frac{dy}{dz} + (z^2 - \nu^2)y = 0$$

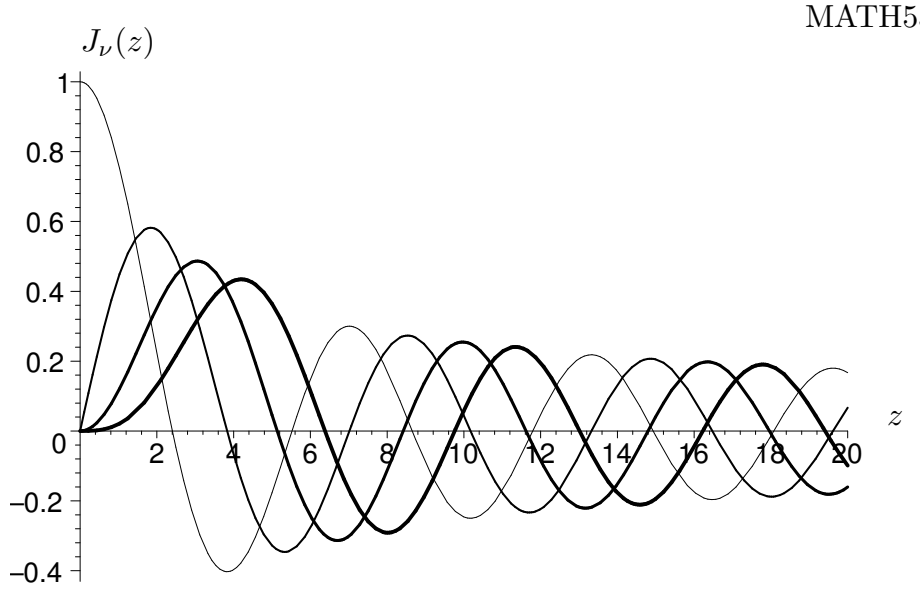
are given by $J_\nu(z)$, $Y_\nu(z)$.

The nth nontrivial (*i.e.*, nonzero) zero of J_ν is denoted $j_{\nu,n}$.



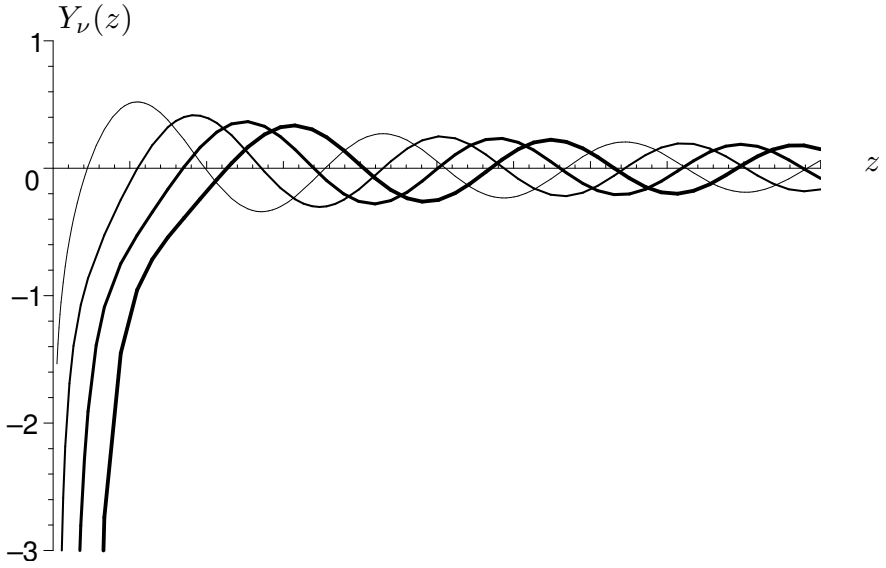
The first six zeroes of $J_1(z)$.

Here is a plot of $J_1(z)$, showing its first six nontrivial zeroes.



$J_\nu(z)$ *vs.* z for $\nu = 0,\ 1,\ 2,\ 3$ (in increasing order of thickness).

Here is a plot of $J_\nu(z)$ for various integral ν. Note that only J_0 is nonzero at $z = 0$. Also note that as z gets large, the Bessel functions follow the same pattern, but are just out of phase, as consistent with the large-z expansion.



$Y_\nu(z)$ *vs.* z for $\nu = 0,\ 1,\ 2,\ 3$ (in increasing order of thickness).

Here is a plot of $Y_\nu(z)$ for various integral ν. Note that all diverge as $z \to 0$. Note also that the zeroes interlace.