Isolated and not isolated Singular Points

We are interested in analytic property.

1. It is given that all zero of trigonometric and hyperbolic functions are

$f(z)$	Solution of $f(z) \neq 0$	allowed values
$\sin z$	$z = n\pi$	$n = 0, \pm 1, \pm 2, \cdots$
$\cos z$	$z = (2n+1)\pi/2$	$n = 0, \pm 1, \pm 2, \cdots$
$\sinh z$	$z = in\pi$	$n = 0, \pm 1, \pm 2$
$\cosh z$	$z = i(2n+1)\pi/2$	$n = 0, \pm 1, \pm 2$

2. Use the above information to show that the trigonometric and hyperbolic functions, listed above have the property that
3. argue that they are analytic where every in the complex plane.
4. for the functions $\tan z, \cot z, \tanh z, \coth z$ list the singular points in a table. These are isolated singular points WHY?

$f(z)$	Singular Points	Isolated or not?
$\tan z$		
$\cot z$		
$\tanh z$		
$\coth z$		

5. Find all singular points of the following functions and sketch them in complex plane.

   (a) $\sin(1/z)$ (b) $\text{cosec}(z)$ (c) $\text{cosec}(1/z)$

   For each case check if the singular point is (points are) isolated or not?