For each of the following functions:

- Show the computations used to determine the zeros or asymptotes as appropriate (We call this "rule of fourths".)
- Show a generic graph
- State:
  - Domain. This should look similar to: $D_f\ x \notin \left\{ \frac{(2k+1)\pi}{2} \right\}$ or $D_f\ x \in \mathbb{R}$
  - Range. Secant and cosecant look like this: $R_f\ f(x) \le 3$ or $f(x) \ge 1$
  - Period
  - Phase Shift (including the direction i.e. left or right)
  - Vertical Shift
- Draw the graph of the function on its own axis. Please indicate significant spots on the graph such as max and/or min points and be sure that the graph spans or touches the *y*-axis.

I suggest that you key in the function as a means of checking the results you have found. Remember however that you will *not* be using a calculator on the 2nd Unit exam.

1) $a(x) = 2\sin\left(\frac{4x}{3} - \frac{\pi}{3}\right) - 1$

2) $b(x) = -\tan\left(\frac{x}{2} - \frac{\pi}{6}\right) - 2$

3) $c(x) = \sec\left(\frac{4x}{3} - \frac{8\pi}{9}\right)$

4) $d(x) = -\sin\left(\frac{x}{2} + \frac{\pi}{6}\right) + 1$

5) $e(x) = 2\tan\left(\frac{4x}{3} - \frac{2\pi}{3}\right) - 2$

6) $f(x) = \sec\left(\frac{x}{2} + \frac{\pi}{4}\right) - 1$

7) $g(x) = -3\cos\left(\frac{4x}{3} - \frac{2\pi}{9}\right)$

8) $h(x) = 3\sin\left(\frac{2x}{3} + \frac{4\pi}{9}\right)$

9) $i(x) = \sec\left(\frac{2x}{3} - \frac{\pi}{6}\right) + 1$

10) $a(x) = -2\cos\left(\frac{3x}{2} - \pi\right) + 2$

11) $b(x) = \csc\left(\frac{2x}{3} - \frac{\pi}{6}\right) + 1$

12) $c(x) = \cot\left(\frac{3x}{2} - \frac{\pi}{4}\right) + 1$

13) $d(x) = \cos\left(\frac{2x}{3} - \frac{\pi}{6}\right) - 1$

14) $e(x) = -2\csc\left(\frac{3x}{2} - \frac{\pi}{4}\right) + 1$

15) $f(x) = \cot\left(\frac{2x}{3} + \frac{2\pi}{9}\right) + 3$

16) $g(x) = \tan\left(\frac{3x}{2} + \frac{3\pi}{4}\right) + 1$

17) $h(x) = 2\csc\left(\frac{x}{2} + \frac{\pi}{6}\right) - 1$

18) $i(x) = \cot\left(\frac{4x}{3} - \frac{\pi}{6}\right)$

1) $-\frac{\pi}{4},\frac{\pi}{2},\frac{5\pi}{4}$

2) $D_b\ x \notin \frac{2(3k+2)\pi}{3}$

3) $D_c\ x \notin \left\{\frac{(18k+25)\pi}{24}\right\}$

4) min $\left(\frac{2\pi}{3},0\right)$ max $\left(\frac{8\pi}{3},2\right)$

5) back up asymptotes: $x=-\frac{5\pi}{8}$ & $x=\frac{\pi}{8}$

6) a min @$\left(-\frac{\pi}{2},0\right)$, a max @ $\left(\frac{3\pi}{2},-2\right)$

7) zeros: $-\frac{5\pi}{24},\frac{13\pi}{24},\frac{31\pi}{24}$

8) $R_h\ -3 \le h(x) \le 3$

9) $D_i\ x \notin \left\{\frac{(3k+2)\pi}{2}\right\}$

10) PS $\frac{2\pi}{3}$ right so back up $-\frac{\pi}{3},\frac{\pi}{3},\pi,\frac{5\pi}{3}$

11) $D_b\ x \notin \frac{(6k+1)\pi}{4}$

12) use $k=-1,0,1,2$ because PS $\frac{\pi}{6}$ right

13) $R_f\ -2 \le d(x) \le 0$

14) $D_e\ x \notin \left\{\frac{(2k+1)\pi}{3}\right\}$

15) PS $\frac{\pi}{3}$ left $R_f\ f(x) \in \mathbb{R}$

16) $D_g\ x \notin \left\{\frac{(8k-1)\pi}{6}\right\}$

17) $-\frac{\pi}{3},\frac{5\pi}{3},\frac{11\pi}{3}$

18) asymptotes: $-\frac{5\pi}{8},\frac{\pi}{8},\frac{7\pi}{8}$