HW 3

Please give complete, well written solutions to the following exercises.

Section 1.5

1. Find all the values for a and b so that

$$f(x) = \begin{cases} ax - b & x \leq -1 \\ 2x^2 + 3ax + b & -1 < x \leq 1 \\ 4 & x > 1 \end{cases}$$

   is continuous.

2. For what values of x is the function $g(x) = (\sin(3x^5 + 10))^{1/3}$ continuous? (Hint: treat the function as a composite function and find the domain of each each part)

3. Use Intermediate Value Theorem to show that the following equation has a root in the given interval.
   $2 \sin x = 3 - 2x$, $(0, \pi/2)$

Section 1.6

4. Find
   $$\lim_{u \to \infty} \frac{4u^4 + 5}{(u^2 - 2)(2u^2 - 1)}$$

5. Find all the horizontal and vertical asymptotes of the following two functions:
   a) $y = \dfrac{\cos^2 x}{x^2}$

   b) $y = \sqrt{x^2 + x + 1} - \sqrt{x^2 - x}$