1. Find the unknown variables a, b such that the following function becomes continuous.

$$f(x) = \begin{cases} a|x-2|+3 & \text{if} \quad x < 1 \\ 5 & \text{if} \quad x = 1 \\ bx^2 - 1 & \text{if} \quad x > 1 \end{cases} \tag{1}$$

Hint: A function f is continuous if at x=1 if both left and right limit at this point exist and they match the value of f(1). Please note that for $a|x-2|+3$ some how you should get rid of the absolute value sign. Pay attention to the interval $x < 1$ and the sign of $|x-2|$ at this interval. We had a similar problem in our last discussion quiz!

2. Find the limit.

$$\lim_{x \to 0} \frac{1 - \cos(2x)}{5x^2} \tag{2}$$

hint: Please note that $\cos(2x) = \cos^2(x) - \sin^2(x) = 2\cos^2(x) - 1 = 1 - 2\sin^2(x)$. You can use one of these equivalences for $\cos(2x)$ and use the fact $\lim_{t \to 0} \frac{\sin(t)}{t} = 1$ in order to evaluate this limit.

3. Find all vertical and horizontal asymptotes of the following function.

$$f(x) = \frac{7x - 1}{x^2 - 6x - 16} \tag{3}$$