Show all work for full credit. No calculators, notes or books are allowed.

(10 pts) 1. Sketch the graph of the following function and use it to determine the values of $a$ for which $\lim_{x \to a} f(x)$ exists.

$$f(x) = \begin{cases} 2 - x, & \text{if } x < -1 \\ x, & \text{if } -1 \leq x < 1 \\ (x - 1)^2, & \text{if } x \geq 1 \end{cases}$$
(35 pts) 2. Evaluate the following limits (if the limit does not exist, explain why).

(a) \( \lim_{x \to 3} \left( 4 - \frac{3x}{5} \right) \)

(b) \( \lim_{x \to 3} \frac{x^2 + x - 12}{x - 3} \)

(c) \( \lim_{h \to 0} \frac{(4+h)^2 - 16}{h} \)

(d) \( \lim_{x \to 4} \frac{x^2 - 16}{\sqrt{x} - 2} \)

(e) \( \lim_{x \to 2} \frac{|x-2|}{x-2} \)
(10 pts) 3. Explain why the function is discontinuous at 0, sketch the graph.

\[
f(x) = \begin{cases} 
  e^x, & \text{if } x < 0 \\
  x^2, & \text{if } x \geq 0
\end{cases}
\]

(10 pts) 4. By calculating an appropriate limit, find the slope of the tangent line to the graph of the function \( f(x) = \sqrt{x} \) at \((1, 1)\).
(10 pts) 5.

(a) From the graph of $f$, state the numbers at which $f$ is discontinuous and explain why.

(b) From the graph of $f$, state the intervals on which $f$ is continuous.
(15 pts) 6. The graph shows the position function of a car. Use the shape of the graph to explain your answers to the following questions.

(a) What was the initial velocity of the car?

(b) Was the car going faster at B or at C?

(c) Was the car slowing down or speeding up at A, B, and C?

(d) What happened between D and E?
(10 pts) 7. Find the constant $c$ that makes $g$ continuous on $(-\infty, +\infty)$.

$$g(x) = \begin{cases} x^2 - c^2, & \text{if } x < 4 \\ cx + 20, & \text{if } x \geq 4 \end{cases}$$