Name: ______________________________ **Section**: ______________

Clear your desk of everything excepts pens, pencils and erasers. **Show all your work.**
If you have a question raise your hand and I will come to you.

1. (1 point) **Multiple Choice. Circle the best answer. No partial credit available**

   Evaluate the limit $\lim_{x\to 1} \dfrac{x^2+9x-10}{x^2-x}$

   A. 11

   B. 10

   C. -10

   D. 0/0

   E. Does not exist or None of the above.

2. (1 point) **Fill-in-the-Blank. No partial credit available**

   (a) $\lim_{x\to 1^+} \dfrac{|1-x|}{x-1} = 1$

   (b) $\lim_{x\to 1^-} \dfrac{|1-x|}{x-1} = -1$

   (c) $\lim_{x\to 1} \dfrac{|1-x|}{x-1}$ Does not exist

3. (2 points) Prove that $\lim_{x\to 1}(x^2-2x) = -1$ using the precise definition of the limit.

   Solution: Let $\varepsilon > 0$. We must show that there exists a number δ so that $|(x^2-2x)-(-1)| < \varepsilon$ whenever x is in the interval $(1-\delta, 1+\delta)$. So let's simplify the ε-inequality algebraically:

$$\begin{aligned} \left|x^2-2x+1\right| &< \varepsilon \\ \left|(x-1)^2\right| &< \varepsilon \\ |x-1|^2 &< \varepsilon \\ |x-1| &< \sqrt{\varepsilon} \end{aligned}$$

   This shows that $\delta = \sqrt{\varepsilon}$ will work, because $|x^2-2x+1| < \varepsilon$ if $|x-1| < \sqrt{\varepsilon}$, which just means that x is in the interval $(1-\sqrt{\varepsilon}, 1+\sqrt{\varepsilon})$.