**Name:** ____________________

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

1. (2 points) **Multiple Choice. No work needed. No partial credit available.** Let $f(x) = 1 - 3x$ and $\epsilon > 0$. What is the largest choice of $\delta$ for which $|x - 1| < \delta$ implies that $|f(x) + 2| < \epsilon$?

   A. $\delta = 1$
   B. $\delta = \epsilon$
   C. $\delta = \frac{\epsilon}{2}$
   D. $\delta = \frac{\epsilon}{3}$
   E. There is no value of $\delta$ that will work.

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

$$\lim_{h \to 0} \frac{\sqrt{9+h} - 3}{h}$$

is $\frac{1}{6}$.

**Extra Work Space.**

1. want $|f(x) + 2| < \varepsilon$

$\iff |(1-3x) + 2| < \varepsilon$

$\iff |3 - 3x| < \varepsilon$

$\iff 3|1 - x| < \varepsilon$

$\iff |x - 1| < \frac{\varepsilon}{3}$

2. $\lim_{h \to 0} \frac{\sqrt{9+h} - 3}{h} \left( \frac{\sqrt{9+h} + 3}{\sqrt{9+h} + 3} \right)$

$= \lim_{h \to 0} \frac{9 + h - 9}{h(\sqrt{9+h} + 3)}$

$= \lim_{h \to 0} \frac{h}{h(\sqrt{9+h} + 3)}$

$= \lim_{h \to 0} \frac{1}{\sqrt{9+h} + 3}$

$= \frac{1}{\sqrt{9} + 3}$

$= \frac{1}{6}$

Continue on to back side

3. (2 points) Suppose that $2x \leq g(x) \leq x^4 - x^2 + 2$ for all $x$. Compute the limit

$$\lim_{x \to 1} g(x)$$

and justify your answer.

Note that $\lim\limits_{x \to 1} 2x = 2$ and $\lim\limits_{x \to 1} x^4 - x^2 + 2 = 1 - 1 + 2 = 2$.

So by the Squeeze Theorem, $\lim\limits_{x \to 1} g(x) = 2$ as well.