Practice Problems

1. Write a limit problem where plugging in gives you $0 \div 0$ but the limit equals 1.
For example, $\lim\limits_{x \to 0} \dfrac{x}{x}$

2. Write a limit problem where plugging in gives you $0 \div 0$ but the limit equals ∞.
For example, $\lim\limits_{x \to 0} \dfrac{x}{x^2}$

3. True or false: It is possible for ∞ / ∞ to give you 0.
True! For example, $\lim\limits_{x \to \infty} \dfrac{x}{x^2} = 0$

4. Find $\lim\limits_{x \to 0} \dfrac{x^3 + 7x^2 - 1/x}{4x^4 + 1/x^2}$ **The lowest power is x^2, so divide by that, which is the same thing as multiplying by x^2. That gives you** $\dfrac{x^5 + 7x^4 - 1x}{4x^6 + 1}$. **Now when you plug in 0 you get 0/1 = 0**

5. Find $\lim\limits_{x \to \infty} 4x^2 - x^3$ **Plugging in gives you $\infty - \infty$, and that is an indeterminate form, so factor. Now you get $x^2(4 - x)$. Now you get $\infty \, (-\infty) = -\infty$**

6. Find $\lim\limits_{x \to 2} \dfrac{\sqrt{x^2 + 6x} - 4}{x - 2}$ **Use the conjugate, $\sqrt{x^2 + 6x} + 4$. On top you get $x^2 + 6x - 16 = (x + 8)(x - 2)$. On the bottom we have $(x - 2)$(ugly conjugate). The $(x - 2)$'s cancel out, so we get $(x + 8)/$(ugly conjugate) $= 10/8 = 1.25$**