I'm here today.

A. True
B. False

$$\mathbf{A}(\mathbf{r}) = \frac{\mu_0}{4\pi} \int \frac{\mathbf{J}(\mathbf{r}')}{\mathfrak{R}} d\tau'$$

- By direct integration, find the vector potential at a distance s from an infinite straight wire carrying a current I
- In which direction does $\mathbf{A}$ point? Does that make sense to you? Why?
- Check that $\nabla \cdot \mathbf{A} = 0$.
- Check that $\nabla \times \mathbf{A} = \mathbf{B}$.
- Is there an analogical problem that we can use to find $\mathbf{A}$, that is, instead of using direct integration?

Consider the many magnetic field problems that you have solved. Using a previously solved problem where you know the current density and magnetic field, develop a physical situation where the structure of the solved problem for $\mathbf{B}$ matches one for an unsolved problem for $\mathbf{A}$.

You are trying to build the analogy between two different problems whose mathematical structure is similar (like we did for the solenoid and the thick wire). Recall,

$$\nabla \times \mathbf{B} = \mu_0 \mathbf{J}$$

$$\nabla \times \mathbf{A} = \mathbf{B}$$

For your unsolved problem, what is $\mathbf{B}$? What current density, $\mathbf{J}$ gives rise to your unsolved problem?