Exercise 1 *Consider the vector* $\vec{\mathbf{u}} = \langle a, a-1 \rangle$.

For how many values of a *does the vector* $\vec{\mathbf{u}} = \langle a, a-1 \rangle$ *have magnitude* $\sqrt{5}$*?*

Multiple Choice:

(a) 0

(b) 1

(c) 2 ✓

(d) 3

(e) *more than three, but finitely many*

(f) *infinitely many*

The values of a *for which* $|\vec{\mathbf{u}}| = \sqrt{5}$ *are* $a = \boxed{-1}$ *and* $a = \boxed{2}$*. (type the smaller of the values first)*

Hint: *The magnitude of* $\vec{\mathbf{u}}$ *in terms of* a *is:*

$$|\vec{\mathbf{u}}| = \sqrt{\boxed{a^2 + (a-1)^2}}$$

Setting $|\vec{\mathbf{u}}| = \sqrt{5}$ *and squaring both sides gives:*

$$\boxed{5} = \boxed{a^2 + (a-1)^2}$$

After a little algebra, this gives a quadratic equation:

$$\boxed{2}a^2 + \left(\boxed{-2}\right)a + \left(\boxed{-4}\right) = 0$$

This can be factored, and the roots are $a = \boxed{-1}$ *and* $a = \boxed{2}$*. (type the smaller root first)*