



$$(1) \cos B = \frac{1^2 + (\sqrt{2})^2 - (\sqrt{5})^2}{2 \times 1 \times \sqrt{2}} = \frac{-2}{2\sqrt{2}} = \boxed{-\frac{1}{\sqrt{2}}}$$

(2) (1)より  $B = 135^\circ$  であるから

$$2R = \frac{\sqrt{5}}{\sin B} \text{ より}$$

$$R = \frac{\sqrt{5}}{2 \times \sin 135^\circ} = \frac{\sqrt{5}}{2 \times \frac{\sqrt{2}}{2}} = \boxed{\frac{\sqrt{10}}{2}}$$

$$(3) \cos D = \cos (180^\circ - B) = -\cos B = \boxed{\frac{1}{\sqrt{2}}}$$

(4)  $AD = x$  とおく

$$(\sqrt{5})^2 = 2^2 + x^2 - 2 \times 2 \times x \cos D \text{ より}$$

$$5 = 4 + x^2 - 4x \times \frac{\sqrt{2}}{2}$$

$$x^2 - 2\sqrt{2}x - 1 = 0$$

$$\therefore x = \sqrt{2} \pm \sqrt{2+1} \quad \text{より } x > 0 \text{ より}$$

$$x = \sqrt{2} + \sqrt{3}$$

$$\text{ゆえに: } \boxed{AD = \sqrt{2} + \sqrt{3}}$$