For each of the following two questions, select *all* correct answers. There is at least one correct answer, and possibly more than one. A fully correct answer gives **one point**, if there is one mistake, it gives $\frac{1}{2}$ *point*, and if there are two mistakes or more, it gives *zero point*.

(1) Which of the following properties are true?

(a) The fundamental group of the Cantor space is trivial for any base point.

(b) The fundamental group of $[0,1] \times \mathbf{S}_1$ at $(0,1)$ is abelian.

(c) The fundamental group of $[0,1] \times \mathbf{S}_1$ at $(0,1)$ is trivial.

(d) The fundamental group of $\mathbf{R}/\mathbf{Z} \times \mathbf{S}_1$ is isomorphic to $\mathbf{Z}$.

(2) Which of the following maps are covering spaces?

(a) The map $f\colon [0,1] \times \mathbf{R} \to [0,1]$ defined by $f(x,y) = x$.

(b) The map $f\colon \mathbf{C} \to \mathbf{C}$ defined by $f(z) = z^2$.

(c) The map $f\colon \mathbf{C}^* \to \mathbf{C}^*$ defined by $f(z) = z^2$, where $\mathbf{C}^* = \mathbf{C} \setminus \{0\}$.

(d) The map $f\colon \mathbf{R} \to [-1,1]$ defined by $f(x) = \cos(x)$.