Unit 7 - Week 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-04, 23:59 IST.

Pick the correct options from each question. There is no negative marking.

1) Suppose X is an infinite compact metric space, (X, f) is a dynamical system, then; *1 point*

- $\omega(f) \neq \varnothing$
- $\omega(f)$ may be an empty set
- $\Omega(X, f) \neq \varnothing$
- $\Omega(X, f)$ may be an empty set

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\omega(f) \neq \varnothing$
$\Omega(X, f) \neq \varnothing$

2) In a dynamical system (X, f), $R(f)$ is the set of all recurrent points, then; *1 point*

- $R(f)$ is an invariant subset
- $R(f)$ is always a dense subset of X
- $R(f)$ is always a closed subset
- If $x \in R(f)$ then $\overline{\mathbb{O}(x)}$ is always a minimal subset of X.

No, the answer is incorrect.
Score: 0
Accepted Answers:
$R(f)$ is an invariant subset

3) Let (X, f) be a dynamical system and Y be an invariant subset of X then; *1 point*

- If a point x is non-wandering in the subsystem (Y, f) then x is non-wandering in (X, f) also
- If x is non-wandering in (Y, f) then x is non-wandering in (X, f) if and only if Y is a closed subset of X.
- If a point $y \in Y$ is non-wandering in (X, f) then y is non-wandering in (Y, f) also.
- If a point $x \in Y$ is non-wandering in (X, f) then y need not to be non-wandering in (Y, f)

No, the answer is incorrect.
Score: 0
Accepted Answers:
If a point x is non-wandering in the subsystem (Y, f) then x is non-wandering in (X, f) also
If a point $x \in Y$ is non-wandering in (X, f) then y need not to be non-wandering in (Y, f)

4) Which of the following is/are true; *1 point*

- In the dynamical system $(\mathbb{S}^1, f)$ where $f(x) = 2\theta \pmod{2\pi}$, $\Omega(\mathbb{S}^1, f) = \mathbb{S}^1$
- In the shift dynamical system (Σ, σ), $\Omega(\Sigma, \sigma) = \Sigma$
- For the rotation system on unit circle $(\mathbb{S}^1, R_\alpha)$, where α is a rational number, $\Omega(\mathbb{S}^1, R_\alpha) \neq \mathbb{S}^1$
- For the rotation system on unit circle $(\mathbb{S}^1, R_\beta)$, where β is an irrational number, $\Omega(\mathbb{S}^1, R_\beta) = \mathbb{S}^1$

No, the answer is incorrect.
Score: 0
Accepted Answers:
In the dynamical system $(\mathbb{S}^1, f)$ where $f(x) = 2\theta \pmod{2\pi}$, $\Omega(\mathbb{S}^1, f) = \mathbb{S}^1$
In the shift dynamical system (Σ, σ), $\Omega(\Sigma, \sigma) = \Sigma$
For the rotation system on unit circle $(\mathbb{S}^1, R_\beta)$, where β is an irrational number, $\Omega(\mathbb{S}^1, R_\beta) = \mathbb{S}^1$

5) Which of the following is/are true; *1 point*

- The system (Tent map) $([0,1], f)$ where $f(x) = \begin{cases} 2x & 0 \le x \le \frac{1}{2} \\ 2(1-x) & \frac{1}{2} \le x \le 1 \end{cases}$ is a topologically transitive system.
- In a dynamical system, every non-wandering point is recurrent
- Suppose $\phi : (X, f) \to (Y, g)$ is a continuous map between two dynamical systems such that $\phi \circ f = g \circ \phi$, then if x is non wandering in $X \Rightarrow \phi(x)$ is non-wandering in Y.
- Suppose $\phi : (X, f) \to (Y, g)$ is a continuous map between two dynamical systems such that $\phi \circ f = g \circ \phi$, then $\phi(\Omega(X, f)) = \Omega(Y, g)$.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The system (Tent map) $([0,1], f)$ where $f(x) = \begin{cases} 2x & 0 \le x \le \frac{1}{2} \\ 2(1-x) & \frac{1}{2} \le x \le 1 \end{cases}$ is a topologically transitive system.
Suppose $\phi : (X, f) \to (Y, g)$ is a continuous map between two dynamical systems such that $\phi \circ f = g \circ \phi$, then if x is non wandering in $X \Rightarrow \phi(x)$ is non-wandering in Y.

6) Which of the following is/are true in a dynamical system (X, f); *1 point*

- Suppose $\phi : (X, f) \to (Y, g)$ is a continuous map between two dynamical systems such that $\phi \circ f = g \circ \phi$, then the image of a recurrent point under ϕ need not be recurrent.
- For the centre $\mathbf{Z}(X, f)$ of the dynamical system (X, f), $\Omega(\mathbf{Z}(X, f), f) = (\mathbf{Z}(X, f), f)$
- Suppose Y be an invariant subset of X in a dynamical system (X, f), if a point x is recurrent in a subsystem (Y, f) of X, then x is recurrent in (X, f) also.
- Every point transitive system is topologically transitive

No, the answer is incorrect.
Score: 0
Accepted Answers:
For the centre $\mathbf{Z}(X, f)$ of the dynamical system (X, f), $\Omega(\mathbf{Z}(X, f), f) = (\mathbf{Z}(X, f), f)$
Suppose Y be an invariant subset of X in a dynamical system (X, f), if a point x is recurrent in a subsystem (Y, f) of X, then x is recurrent in (X, f) also.

7) Consider a dynamical system (X, f), where X is compact. Suppose X has a dense set of recurrent points, then; *1 point*

- f will be onto
- f need not be onto
- f will be a one-one map
- $f(X)$ will have an empty interior

No, the answer is incorrect.
Score: 0
Accepted Answers:
f will be onto