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Unit 5 - Week 4

Assignment 4

The due date for submitting this assignment has passed. Due on 2018-03-07, 23:59 IST.
As per our records you have not submitted this assignment.

1) Which type of network motif can give rise to oscillation in concentration of a molecule involved in the motif? **2 points**

- Negative feedback
- Coherent feed-forward loops
- Positive feedback
- Positive auto-regulation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Negative feedback

2) Which of the following is correct for an adaptive motif? **2 points**

- Gives rise to oscillatory output.
- Output remains same for all input signals.
- The output depends upon the input signal.
- Gives rise to bimodal population distribution.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Output remains same for all input signals.

3) BioModels is a _____. **2 points**

- repository of computational models of biological processes.
- database of kinetic parameters of enzymes.
- software for mathematical models.
- repository of modeled structures of proteins.

No, the answer is incorrect.
Score: 0

Accepted Answers:
repository of computational models of biological processes.

4) BRENDA is a _____ **2 points**

- database for mathematical models.
- repository of modeled structures of proteins.
- repository of information on enzymes.
- database of kinetic parameters of enzymes.

No, the answer is incorrect.
Score: 0

Accepted Answers:
repository of information on enzymes.

5) A network motif is represented by the following ODE. What type of network motif is this? **2 points**

$$\frac{d[X]}{dt} = k_1 + \frac{k_2[X]}{1+[X]} - k_3[X]$$

- Positive feedback
- Negative feedback
- Bi-fan
- Coherent feed-forward

No, the answer is incorrect.
Score: 0

Accepted Answers:
Positive feedback

6) Two proteins control each other expression. The dynamics is represented by the following set of ODEs: **2 points**

$$\frac{dx}{dt} = \frac{1}{(1+y)} - x; \quad \frac{dy}{dt} = \frac{1}{(1+x)} - y$$

What type of network motif is this?

- Mutual repression
- Negative feed-back
- Feed-forward
- Mutual activation

No, the answer is incorrect.
Score: 0

Accepted Answers:
Mutual repression

7) Two proteins control each other expression. The dynamics is represented by the following set of ODEs: **2 points**

$$\frac{dx}{dt} = \frac{1}{(1+y)} - x; \quad \frac{dy}{dt} = \frac{1}{(1+x)} - y$$

How many steady states do you expect for this system?

- 4
- 2
- 1
- 3

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

8) Expression of a protein is controlled by an external signal S. The protein also controls its own expression by a **2 points**

negative feedback. The following ODEs represent the dynamics of the system, with m and P representing mRNA and protein respectively.

$$\frac{d[m]}{dt} = \frac{S}{1+S} \cdot \frac{1}{1+[P]} - [m]$$

$$\frac{d[P]}{dt} = [m] - [P]$$

For S =1, calculate the number of time m and P nullclines will intersect.

- 1
- 3
- 4
- 2

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

9) Signal S activates production of y and z. y controls degradation of z. ***2 points***

The following system of ODEs is used to model the system:

$$\frac{d[y]}{dt} = k_1 \cdot s - k_2 \cdot [y]; \frac{d[z]}{dt} = k_3 \cdot s - k_4 \cdot [y] \cdot [z]$$

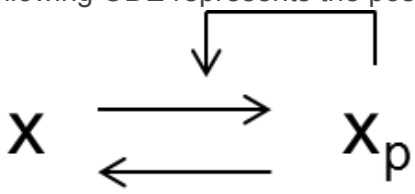
Which of the following statement is correct?

- For very high value of s, z will have sustained oscillation.
- Steady state of z does not depend on external signal s.
- Steady state of y does not depend upon external signal s.
- Nullclines of y and z intersects three times.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Steady state of z does not depend on external signal s.

10) The following ODE represents the positive feedback system given here: ***2 points***



$$\frac{d[x_p]}{dt} = k_1 \cdot ([x]_T - [x_p]) \cdot [x_p] - k_2 \cdot [x_p]$$

here, $[x]_T$ = concentration of total x.

k_1 = rate constant for feedback.

k_2 = rate constant for degradation.

Which of the following is correct for the non-zero steady state of x_p?

- The non-zero steady state of x_p depends only on the value of k_2.
- The non-zero steady state of x_p increases with k_1.
- The non-zero steady state of x_p is independent of k_1 and k_2.
- The non-zero steady state of x_p decreases with increase in k_1.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The non-zero steady state of x_p increases with k_1.

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