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NPTEL

Unit 5 - Week 1

Assignment 1

The due date for submitting this assignment has passed. **Due on 2018-08-15, 23:59 IST.**
As per our records you have not submitted this assignment.

1) Which of the following is true regarding Michaelis–Menten kinetics? ***1 point***

- It gives the final rate of product formation, for a given substrate concentration
- It is an example of a stochastic model
- A low value of K_M (Michelis–Menten constant) indicates that the binding of the enzyme with the substrate is high
- the ν_{max} for a reaction remains unchanged on doubling enzyme concentration
- the equation is unchanged when inhibitors are present

No, the answer is incorrect.
Score: 0

Accepted Answers:
A low value of K_M (Michelis–Menten constant) indicates that the binding of the enzyme with the substrate is high

2) ***1 point***

The Hill equation is used to depict the binding of ligand to a macromolecule such as protein. This equation, which was formulated by Archibald Hill was used to describe equilibrium relationship between the oxygen tension and the saturation of haemogl Ever since, the Hill equation has been used to study the reaction kinetics that show sigmoidal behaviour. This can be described as follows:

$$v = \frac{\nu_{max}[L]^n}{(K_{0.5})^n + [L]^n}$$

where v is the velocity of the reaction
ν_{max} is the maximum velocity of the reaction
L is the concentration of free unbound ligand
$K_{0.5}$ is the concentration of ligand at which velocity of the reaction is half the maxim
n is the Hill coefficient, which is the measure of cooperativity of ligand binding to the protein, a value of n > 1 indicates positive cooperative binding, n < 1 indicates negat cooperative binding, n = 1 indicates noncooperative binding. n of oxygen binding to haemoglobin is within the range of 1.7-3.2.

This equation is ____, and the Variable(s), Parameter(s) and Constant(s) in this equa is/are:

Develo

- Nonlinear, Variables - v, n, L Parameters $-K_{0.5}, v_{max}$ Constant – This equation has no constants
- Linear, Variables - v, L Parameters $-K_{0.5}, v_{max}, n$ Constant – This equation has no constants

No, the answer is incorrect.
Score: 0

Accepted Answers:
Nonlinear, Variables - v, L Parameters $-K_{0.5}, v_{max}, n$ Constant – This equation has no constants

3) Which of the following is true for a mathematical model: ***1 point***

- All models are wrong, practically
- Only true for the assumptions that we make
- Never overfits if you consider large data
- Complex models always perform better than a simple model
- Simple models may be preferable under some circumstances

No, the answer is incorrect.
Score: 0

Accepted Answers:
All models are wrong, practically
Only true for the assumptions that we make
Simple models may be preferable under some circumstances

4) You are asked to build a model to predict max and min temperature for the city of New Delhi. Data collected from the year 2000 to 2015 is given to you, which measures different parameters such as humidity, solar radiation, pollution, air velocity, pressure,etc. You use a polynomial regression model by reducing the Root Mean Square Error. The model you have built is: ***1 point***

- Mathematical
- Deterministic
- Stochastic
- Discontinuous
- Empirical

No, the answer is incorrect.
Score: 0

Accepted Answers:
Mathematical
Deterministic
Empirical

5) ***1 point***

We have discussed the SIR model for spread of infectious diseases where S represent people susceptible to disease, I are infected patients and R are patients who hav recovered. The complexity of the SIR model is dependent on the assumptions we mak and the parameters we consider. The rate of susceptible people is likely dependent on

- The birth rate of the population
- The genetic resistance found in the population
- Environmental factors that found to correlated with disease
- Availability of medical resources such as vaccines
- Geographical location

No, the answer is incorrect.
Score: 0

Accepted Answers:
The birth rate of the population
The genetic resistance found in the population
Environmental factors that found to correlated with disease
Availability of medical resources such as vaccines
Geographical location

6) Biological systems are mostly **1 point**

- [ ] Sensitive
- [ ] Stable
- [ ] Consistent
- [ ] Complex
- [ ] Homogeneous

No, the answer is incorrect.
Score: 0

Accepted Answers:
Stable
Complex

7) Which of the following expressions will evaluate to zero in MATLAB? **1 point**

- [ ] 0.1+0.2-0.3
- [ ] sqrt(9)-(3/sqrt(9))
- [ ] sqrt(3)-sqrt(3)
- [ ] 10^500-10^500
- [ ] 7-21/3

No, the answer is incorrect.
Score: 0

Accepted Answers:
sqrt(3)-sqrt(3)
7-21/3

8) Consider the function add_test below. The function will return a value of zero, for **1 point**

```
1  function val = add_test(f)
2
3  val = 0;
4  for k = 1:10
5      val = val + f;
6  end
7  for k = 1:10
8      val = val - f;
9  end
```

- [ ] all real values of f
- [ ] all integer values of f
- [ ] all negative powers of 2, e.g. 0.5, 0.25, 0.125
- [ ] any exact binary floating-point number, e.g. 0.100000001490116119384765625
- [ ] f = NaN

No, the answer is incorrect.
Score: 0

Accepted Answers:

all integer values of f
all negative powers of 2, e.g. 0.5, 0.25, 0.125
any exact binary floating-point number, e.g. 0.100000001490116119384765625

9) Suppose you have a matrix A = rand(1000,1000). Which of the following are ways to set all values in the matrix that are (strictly) greater than 0.5 to 0? **1 point**

- [ ] A(A>0.5)=0
- [ ] A(find(A>0.5)) = 0
- [ ] [i,j] = find(A>0.5)
  for v = 1:length(i)
  A(v(i),v(j)) = 0;
  end
- [ ] A=A-A(A>0.5)
- [ ] A>0.5=0

No, the answer is incorrect.
Score: 0

Accepted Answers:
A(A>0.5)=0
A(find(A>0.5)) = 0

10) What is the output of the following code, for n = 11? The output for n = 8 is exactly “8 4 2 1 ” (note the spaces!). You must solve this question without using MATLAB, to gain the habit of understanding code and “dry running” it.

```
function collatz(n)
x = n;
while (n~=1)
    if (mod(n,2)==0)
        n = n/2;
    else
        n = 3*n + 1;
    end
    x = [x n];
end
fprintf('%d ',x)
```

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

1 point

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