

## HW07 - Diet & Nutrition

1 6 points

Select the true statements.

- Undernourishment is fundamentally a problem of too few calories
- You can be simultaneously malnourished and overweight
- You can be simultaneously malnourished and underweight
- Malnourishment is fundamentally a problem of too few calories
- Malnourished and undernourished mean the same thing

2 4 points

A carbohydrate used for directly fueling metabolic processes is typically a \_\_\_\_\_, while a carbohydrate used for energy storage is typically a \_\_\_\_\_.

- $\beta$ -D glucose, D-glucose
- cellulose, fructose
- polysaccharide, monosaccharide
- monosaccharide, polysaccharide

3 6 points

Plants and animals naturally produce which of the following? (select all that apply)

- Trans fatty acids
- Free fatty acids
- Monounsaturated fats
- Cis fatty acids

4 4 points

An amino acid has a phenol functional group on its side chain. This side chain is characterized as...

- polar, basic
- nonpolar, acidic
- nonpolar, basic
- nonpolar, neutral
- polar, neutral

5 5 points

The polar amino acid side chains are divided into which set of subcategories?

- acidic, basic, and neutral
- hydrophilic and hydrophobic
- combustible, nutritional

6 5 points

An amino acid has a methyl group side chain. Which of the following best characterizes the amino acid?

- polar, hydrophobic
- nonpolar, hydrophobic
- nonpolar, hydrophilic
- polar, hydrophilic

7 5 points

What functional group is present on the **side chain** of all basic amino acids?

- a nonpolar methyl group
- a carboxylic acid
- a phenol
- an amine

8 5 points

Which two amino acids have amide functional groups on their side chain?

- aspartate and glutamate
- aspartate and arginine
- tryptophan and leucine
- asparagine and glutamine
- arginine and lysine

9 5 points

Consider the alanine molecule in the human body. What is the charge on nitrogen, oxygen, and the overall alanine molecule?

- +1, -1, -2
- +1, +1, +2
- +1, -1, +2
- 0, +1, +1
- 0, 0, 0
- +1, +1, 0
- 0, -1, -1
- +1, -1, 0

10 6 points

Choose the correct statements from below:

- A main oil component of olive oil is oleic acid
- Oleic acid is a trans fatty acid.
- The carbon chains on oleic acid are on the same side of the double bond.
- The main oil component of olive oil is a trans fat.
- Oleic acid is a cis mono-unsaturated fatty acid.

11 4 points

Which functional group is fundamental to a fatty acid?

- nitrile
- amide
- aldehyde
- amine
- carboxylic acid

12 6 points

Which component of saturated fatty acids is worth noting with respect to the health risk associated with their consumption?

- A more branched structure in the fatty acid chain causes the fat to have a greater viscosity/thickness.
- A more linear structure in the fatty acid chain results in more regions of overlap, causing a greater viscosity/thickness in the body

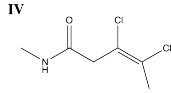
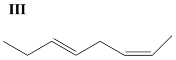
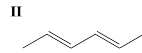
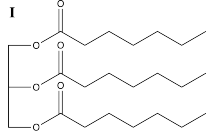
13 4 points

Hydrogenating oils have which of the following **two** impacts on a fatty acid chain?

- creates a healthier, less viscous mixture
- reduces branching in the fatty acid molecule
- creates more branching in the fatty acid molecule
- creates a more viscous oil

14 5 points

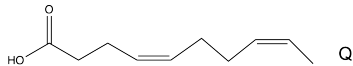
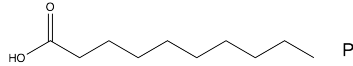
Which of the molecules below have *cis* functionalities?



- I and II
- II and III
- I and IV
- III and IV

15 5 points

Which of the two fatty acids pictured below would be expected to have a higher melting point?



- Q
- P

16 5 points

Which formula below could be a triglyceride?

- $C_{20}H_{40}O_2$
- $C_{27}H_{50}O_6$
- $C_{18}H_{38}$

17 6 points

Select the elements with NO known nutritive value.

- B
- Cd
- I
- Zn
- Fe
- Se
- Co
- Na
- Mg
- Hg
- Cu
- Ca
- Pb
- Cl

18 4 points

A mass of cellulose can provide \_\_\_\_\_ combustion heat energy as/than an equal mass of starch.

The same mass of cellulose provides \_\_\_\_\_ nutritive calories to humans compared to the starch.

- less, no
- equal, more
- less, fewer
- equal, no
- more, fewer
- more, more

19 5 points

Which of the following macronutrients provides the most calories per gram?

- water
- carbohydrates
- fats
- protein

20 5 points

We are constantly converting food energy into both heat and mechanical energy, allowing us to maintain a body temp ~7-8 °C above "room temperature" all day, and to move around the world and interact with it. If instead you treated the human body as a 70 kg sack of water that started each day at 25 °C, how hot could a person get from 2000 Calories of food (assuming it metabolized the food perfectly to heat energy)?

- 98 °F
- 54 °F
- 129 °F