UNIVERSITA' DEGLI STUDI DI ROMA TOR VERGATA

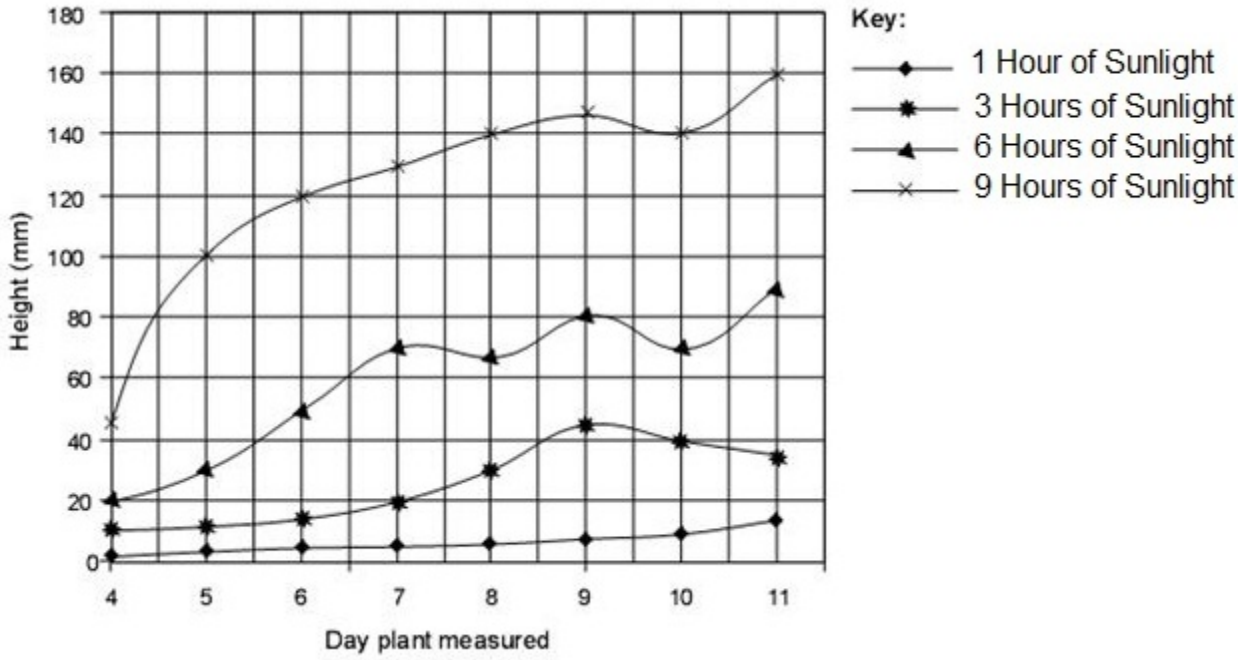
FACOLTA' DI SCIENZE MATEMATICHE FISICHE E NATURALI

PROVA SCRITTA DI LINGUA INGLESE E 1-B (FASCIA M-Z)

COGNOME……..... NOME……DATA……..MATRICOLA……

1. **DESCRIBING GRAPHS** **…../30**

This line graph compares the growth of plants that were kept in the sun for different amounts of time. Write a coherent text describing the direction and extent of its trend and the degree and speed of change.



2. TEXT BUILDING …../30

Consider the following expressions a), b) and c): read the corresponding solutions, then convert the three Mathematical formalisms and their corresponding solutions into words and sentences forming ONE coherent and cohesive text using appropriate connectives and adapting the numerals to the text in an appropriate way. Finally describe the corresponding graph and make it work as a conclusion, appropriately placing it in the context.

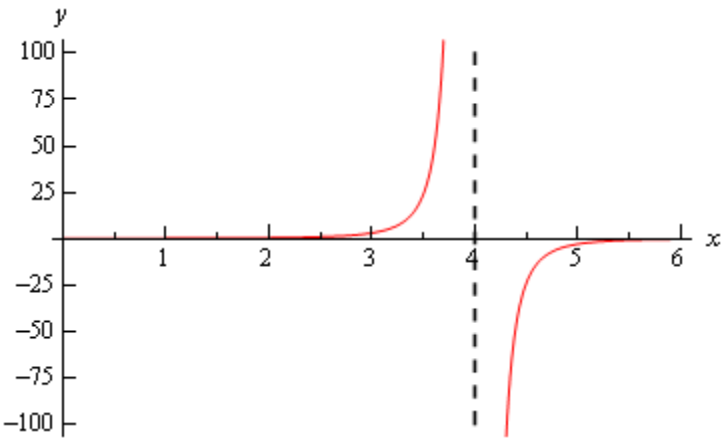
$$\lim_{x\to 4^+} \frac{3}{(4-x)^3} \qquad \lim_{x\to 4^-} \frac{3}{(4-x)^3} \qquad \lim_{x\to 4} \frac{3}{(4-x)^3}$$

a) b) c)

a) x > 4 => 4 – x < 0 => (4-x)^3 < 0; 4 –x → 0, x → 4; => (constant > 0) / (↑ small number < 0) => lim = - ∞

b) x < 4 => 4 – x > 0 => (4-x)^3 > 0; 4 –x → 0, x → 4; => (constant > 0) / (↑small number > 0) => lim = + ∞

c) lim x → 4+ ≠ lim x → 4- => lim x → 4 ∄



3. OPEN QUESTIONS …../60

Choose **TWO** of the following subjects and write a 15-to-20-line text for each of them. You MUST use appropriate connectives and relative clauses together with tenses both in the active and passive forms.

1) Define the enthalpy of formation adapting the following example to the text:
   C (s) + ½ O2 → CO (g) ΔH°f = -110,5 KJ
   CO (g) + ½ O2 → CO2 (g) ΔH°f = - 283 KJ

   C (s) + O2 -393,5 KJ
   where ΔH°f is the standard enthalpy of formation.
2) Define redox reactions and oxidation numbers adapting the following reaction and corresponding half reactions to the text:
   Fe + 2HCl → FeCl2 + H2; Fe → Fe^{+2} + 2e- (oxidized) ; $2H^{+1}$ + 2e- → H2 (reduced)
3) Consider the following situation: we have 98 ml of an unknown gas, at STP, its mass being 0.081 g, and we want to figure out its molar mass (mass/mole). Since we know that 1 mole (STP) = 22,4 l and p = 1 atm, then 1 mole / 22,4 l = x / 0.098 => x = 0.004375 moles => 0.081 g / 0.004375 = 18.5 g/mole => the missing substance is H2O. In what way does this context fit in the definition of an ideal gas system?
4) Consider the following pseudo code about the rectangle method approximation in Java:
   input a, b, n; // a = left end point of integral , b = right end poin n = # rectangles used
   w = (b - a)/n; // Compute width
   sum = sum of area of the n rectangles; // Compute area
   print sum; // Print result
   Now build up the corresponding coherent text in English and say how and show in what way it emphasizes the definition of a definite integral.
5) Consider the combination of multiple different kind of alleles in blood types A, B, O. In what way do genes combine? What does an AB blood-type parent mean in this context? Assuming the other parent being a fully A blood type, what is the phenotype going to be like? What kind of alleles is the genotype going to have? Now build up the corresponding punnett square, make your conclusions, calculate the probability of any A types and adapt both your answers and the grid in the context of offspring heredity and the corresponding allele frequency's equilibrium theories using appropriate adjectives' order.

4. LOGICAL FUNCTIONS ….../30

Annie A and Bree B both like circuitry, but they don't like each other. As a result Annie will not build up her circuit C if Bree goes to the lab and builds up hers. Feelings are mutual, and Bree won't go there and build up hers if Annie is there. Build the event/result table and w rite appropriate if clauses of the first, the second and the third type only for the events that show a positive result in the output with respect to a) somebody building the circuit; b) nobody building the circuit. Then connect them using the appropriate logical connectives.

Hint: the two variables are A and B. There are 4 possible combinations: 1) neither A nor B builds the circuit; 2) A does not build but Bruce does; 3) A builds but Bruce does not; 4) both A and B build the circuit.

Represent building the circuit by a 1 and not building by a 0 and build up the corresponding truth table: of the four possibilities only two will result in anyone building the circuit. Then emphasize the and/or connectives in the Boolean equation and use them to connect the if clauses into a coherent text.

PUNTEGGIO TOTALE: …./150 pari a …./30 RISULTATO: idoneo ☐ non idoneo ☐