I.I.S. Galilei- Artiglio Compito di matematica Anno scolastico

Nome ….....Cognome.....Data.....

A) INTEGRALI (0,50 x10)

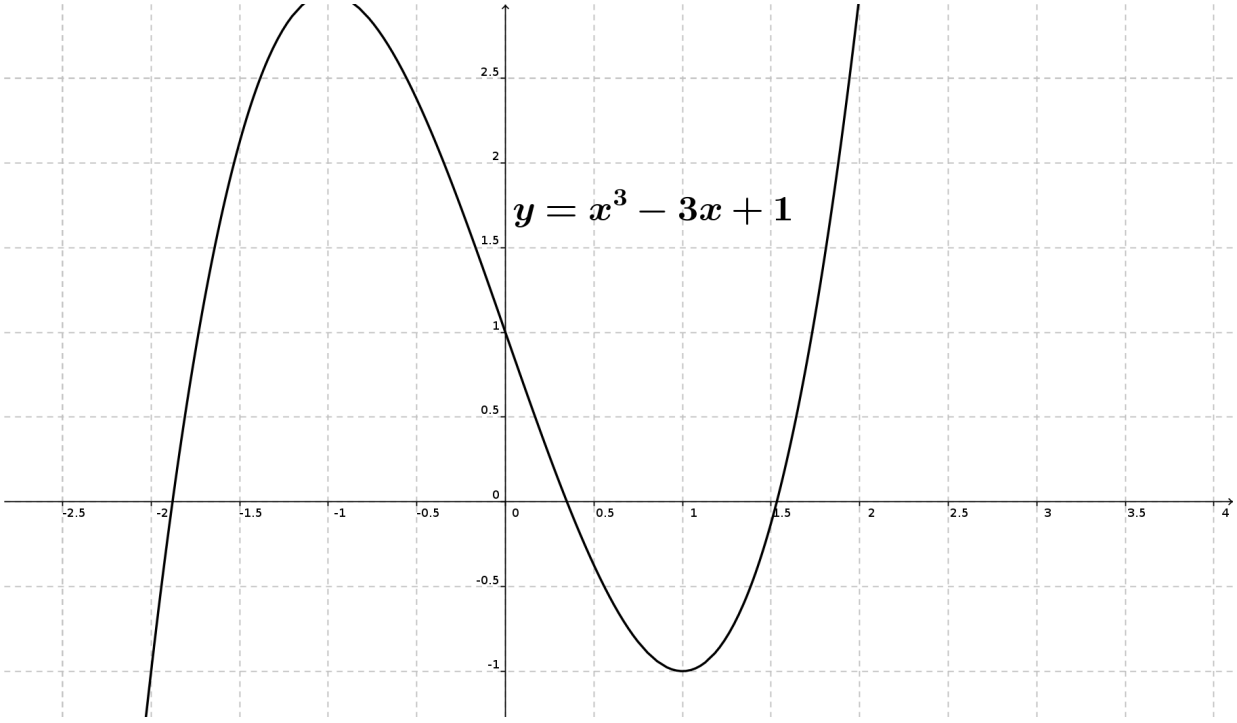
1. $\int x\cdot\left(x^2+1\right)^3 dx$
2. $\int \frac{1}{\sqrt{5-x^2}} dx$
3. $\int x\left(3-x\right)^4 dx$
4. $\int \frac{\left(\ln x-1\right)^3}{x} dx$
5. $\int x\cdot e^{2x} dx$
6. $\int arctanx\, dx$
7. $\int \frac{x^2-4}{x^2+1} dx$
8 $\int \left(2t+2\right)\left(\sqrt[3]{t}-1\right) dt$
9. $\int \frac{1}{x^2+15} dx$
10. $\int \frac{\sqrt{1+\tan x}}{\cos^2 x} dx$

FAI LA VERIFICA DI 3 PRIMITIVE TROVATE NEGLI ESERCIZI SOPRA (0,3)

B) Using L'Hospital's Rule, evaluate the following limits: (1,2)

1) $\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{tanx}\right)$
2) $\lim_{x\to 0^+}\left(1+x^2\right)^{\frac{1}{x^3}}$
2) $\lim_{x\to 0^+}\frac{\ln senx}{\ln x^2}$

C) Proof that the equation $x^3-3x+1=0$ has got a solution between 0 and 1. Can you proof that this solution is unique ? Use Newton's method with $x_0=0$ to approximate the solution. (find at least x_1 and x_2) . Draw in this graph the Newton's method. (1,20)



D) Consider the sentence “ If our first guess in Newton's method is a point at which there is a horizontal tangent line, then this line will never hit the x-axis, and Newton's Method will fail to locate a root.” . Considering this sentence, in exercise above could you take $x_0=1$ as starting point ? Explain your opinion.

E) Di una funzione f(x) si sa che la sua derivata seconda è 2^x e che $f(0)=\left(\frac{1}{\ln 2}\right)^2$ e $f'(0)=0$. Trova f (x) (maturità) (0,70)