COMPETITIVE ENTRANCE EXAMINATION INTO HTTC BAMBILI	
CYCLE: **2nd CYCLE** LEVEL: **1st YEAR**	**2013 SESSION**
DURATION 3 HOURS	

trajectory of n, its flight duration, its maximum altitude and its expansion factor with two decimals digits.

1. The x and y intercepts of the function

   f: IR → IR, x → f(x) = $\frac{x^2-5x+4}{x^2-3}$ are

   A. 1 and 4, $\frac{4}{3}$

   B. 1 and 4, - $\frac{4}{3}$

   C. $-\sqrt{3}$ and $\sqrt{3}$, 1

   D. $-\sqrt{3}$ and $-\frac{4}{3}, -\frac{4}{3}$

2. Which of the following is the correct statement about the graph of y = $\sqrt[3]{x}$

   A. Increasing, symmetric about origin

   B. Increasing, symmetric about x-axis

   C. Decreasing, symmetric about origin

   D. Decreasing, symmetric about x-axis

3. Starting from what it means for a sequence $(x_n)n\geq1$ of real numbers to be convergent as n →∞, the correct statement of what it means for a sequence not to be convergent in IR is

   A. $\exists l \in IR$, such that $\forall\varepsilon > 0, |x_n - l| \geq \varepsilon$

   B. $\forall\, l \in IR, \forall\varepsilon > 0, \exists N(\varepsilon) \geq 1$ such that $\forall\, n \geq N, |x_n - l| \geq \varepsilon$

   C. $\forall\, l \in IR, \exists\, \varepsilon > 0$ such that $\forall\, N(\varepsilon) \geq 1,\ \exists n \geq N$ such that $|x_n - l| \geq \varepsilon$

   D. $\forall\, l \in IR, \forall\varepsilon > 0, \forall\, N(\varepsilon) \geq 1, \forall n \geq N\ \ |x_n - l| < \varepsilon$

4. Given f: x → f(x) = $x^3 + 2x + 2$, x € IR, a zero of f is found in
   A. -2 < x< -1
   B. -1 <x< 0
   C. 0< x< 1
   D. 1 <x< 2
5. Suppose the mosquito population in a certain area grows exponentially from M to 10 M in 3 days. A correct formula for the population y(t) at time t is
   A. $y(t)= Me^{3t\ln(10)}$, $y(12)= 10^{36}M$
   B. $y(t)= 3Me^{10t\ln(3)}$, $y(12)= 3^{121}M$
   C. $y(t)=Me^{1/3t\ln(10)}$, $y(12)=10^{4}M$
   D. $y(t)=Me^{t\ln(10)}$), $y(12)=10^{12}M$
6. One million is invested at the beginning of each year and interest is paid at five percent on the balance at the end of each year. The balance, to the nearest franc, at the end of twenty-five years is
   A. 26, 250, 000
   B. 40, 000, 000
   C. 50, 113, 450
   D. 25, 125, 000
7. The series $\sum_{n=1}^{\infty}(\frac{3+5n}{4}x^{n-1})$, x ∈ IR;
   A. Diverges to ∞ for every x ∈ IR
   B. Converges to $\frac{8}{4(1-x)}$ for every x ∈ IR;
   C. Oscillates for every x ∈ IR
   D. Converges to $\frac{8-3x}{4(1-x)^2}$, -1< x< 1
8. The sequence (x_n) n≥1, defined by $x_1>0$ $x_{n+1}= \frac{1}{2}(x_a+ \frac{a}{x_n})$, a>0, n≥1, is (except for x_1)

A. Decreasing and $\lim_{n \to \infty} x_n = \sqrt{a}$
B. Increasing and $\lim_{n \to \infty} x_n = \sqrt{a}$
C. Decreasing and $\lim_{n \to \infty} x_n = a$
D. Increasing and $\lim_{n \to \infty} x_n = a$

9. If f and g are differentiable functions with $g(x)= x^2 f(\cos(x\pi/3))$, and $f\left(\frac{1}{2}\right) = 1$, $f'\left(\frac{1}{2}\right)= -1$, then g'(1) is

A. $-\frac{2\pi}{3}$
B. $2 + \frac{\sqrt{3}\pi}{6}$
C. $2 - \frac{\sqrt{3}\pi}{6}$
D. $\frac{2\pi}{3}$

10. If x_0 and x_1 are points where the function

$f(x) = \frac{x}{x^2+1}$ achieves a global minimum and global maximum, then their values are:

A. $x_0 = 0$ and $x_1 = 1$
B. $x_0 = 1$ and $x_1 = -1$
C. $x_0 = -1$ and $x_1 = 1$
D. None of the above

11. The value of a for which the differential equations $(x^3+ a^2y)dx + (4x-y^3)dy=0$ is exact is

A. 1, 2
B. -1, 2
C. -2, 2
D. 3, -4

12. At the point x=ln(2), the Wronskian of the two linearly independent solutions of the differential equations y''(x)-2y'(x) + 2y(x)=0 is

A. 1
B. ½
C. 5
D. ¼

13. The Casoration of n! and $(-1)^n$ n! is

A. 0
B. n!(n+1)!
C. $(-1)^n n!$
D. $2(-1)^{n+1}n!(n+1)!$

14. The solution of the difference equation $y_{n+2}-y_n=n$, $y_o=1$, $y_1=7/4$ is

A. $\frac{11}{8}+(-1)^{n+1}\frac{3}{8}+n$
B. $1+(-1)^n\frac{7}{4}+n+n^2/4-\frac{1}{2}n$
C. $(-1)^n+n^2/4-\frac{1}{2}n$
D. $\frac{3}{2}+(-1)^{n+1}\frac{1}{2}+\frac{1}{4}n^2-\frac{1}{2}n$

15. The set of values of β for which the mapping

φ: $IR^2 \rightarrow IR^2$ defined by $\varphi(x,y)=\begin{pmatrix}\beta & 1\\ 8 & 2\end{pmatrix}\binom{x}{y}+\binom{3}{4}$ is an affine map is

A. {1,-1}
B. IR
C. {∅}
D. IR\{-2,2}

16. The level act of the function f : IR→IR where f(x,y)= x^2+y^2 at height -1 is

A. {-1}

B. ∅

C. {0, 1}

D. {-1, -1}

17. If S(f, Pn)=$f(x) = \sum_{n=1}^{\infty}$(f(tk)Δxk) is the Reimann sum for a function f: x → $f(x)$, x∈ [0,1] , for a regular partition Pn of [0,1] with n+1 points. The estimate for S($\frac{3}{x+2}$, P4) with tk being midpoint is

A. $\frac{3}{2.125} + \frac{3}{2.375} + \frac{3}{2.625} + \frac{3}{2.875}$

B. $\frac{1}{4}\left(\frac{3}{2.25} + \frac{3}{2.5} + \frac{3}{2.75} + \frac{3}{3}\right)$

C. $\frac{1}{4}\left(\frac{3}{2.125} + \frac{3}{2.375} + \frac{3}{2.625} + \frac{3}{2.875}\right)$

D. $\frac{1}{4}\left(\frac{3}{2} + \frac{3}{2.25} + \frac{3}{2.5} + \frac{3}{2.75}\right)$

18. The function f(x, y) = $x^3 + y^3 - 3xy$ has a critical point at (x, y) = (1, 1). (1, 1) is

A. Local minimum point for f

B. Local maximum point for f

C. Global maximum point for f

D. Saddle point for f

19. The equation of the plane passing through the points (1, 1, 6), (2, -1, 2) and (0, 1, 4) and the coordinates of the z-intercept of the plane are

A. z=2x+ 3y+1, (0, 0, 1)

B. z+2x-3y +1=0, (0, 0, -1)

C. 2z = 2x- 3y-1, (0, 0, -1/2)

D. z= 4x + 3y +2, (0, 0, 2)

20. Which of the following infinite series of constants converge?

A. $\sum_{n=1}^{\infty}\left(\frac{-1}{9}\right)^{k}$

B. $\sum_{n=1}^{\infty}\left(\frac{-10}{9}\right)^{k}$

C. $\sum_{n=1}^{\infty}(-2)^{k}$

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D. $\sum_{n=1}^{\infty}(-1)^{k}$

Question 1 to 2

A ball is dropped from the top of a cliff, 49 m high.

1. How long does it take to hit the ground?

   A. 3.5 secs B. 3.8 secs

2. At what speed is it the travelling

   A 31 m/s B 36 m/s

3. Which of the following statements describes a vector quantity?

A a car travelled north B a car travelled at 100 km/h

C a car travelled north at 100 km/h D a car travelled 200 km at 100 km/h

Question 4 to 8

A police officer is on a speed trap on straight portion along Douala-Yaounde road of length AB where AB= 186 m. A car passes the point A travelling at 26.5 m/s and accelerating at a constant rate of 10 m/s^2