Lagos State University
Faculty Of Science
Department of Mathematics
Harmattan Semester Examination :: 2012/2013 Session

MAT 101 - Algebra

Time Allowed: $1\frac{1}{2}$Hours OPTION 1 **REPRODUCED BY BUNDAY TUTORIAL**
Instruction: *Answer All questions. Shade Option E where none of options A,B,C,D is Correct.*

1. Find the set of values of p for which the equation $x^2 + px + 2p - 3 = 0$ has no real roots (A) $2 < p < 6$ (B) $-2 < p < 6$ (C) $-3 < p < 2$ (D) $2 < p < 3$

2. The sum of the first ten terms of an arithmetic series is 60, the sum of the first twenty-two terms is 220. Find the common difference and the first term of the series (A) $\frac{2}{3}, 3$ (B) $\frac{3}{2}, 1$ (C) $1, \frac{2}{3}$ (D) $3, \frac{3}{2}$

3. Use mathematical induction to find the sum to nth term of the series $\frac{1}{1.2} + \frac{1}{2.3} + ... + \frac{1}{n(n+1)}$ (A) $\frac{n}{n+1}$ (B) $2n - 1$ (C) $n(n-1)$ (D) $\frac{1}{n+1}$
Use for the next three questions
If N is the universal set consisting of all integers and P,Q,R are subsets such that $P = \{x : x \text{ is a prime number}\}$, $Q = \{x : x \text{ is a multiple of } 4\}$, $R = \{x : x \text{ is an even number}\}$

4. Find $Q \cap R$? (A) $\{4\}$ (B) $\{2\}$ (C) Q (D) $\{2, 4\}$

5. Find $P \cap R \cap Q'$? (A) $\{2\}$ (B) P (C) $\{4\}$ (D) R

6. Find $Q \cup R \cap (P' \cap Q')$? (A) $\{1\}$ (B) R (C) Q (D) $\{10\}$

7. Give the first three terms of $(2+x)^5$ in ascending powers of x (A) $4+10x+10x^2+5x^3$ (B) $40x^3+80x^2+80x+32$ (C) $32 + 80x + 80x^2 + 40x^3$ (D) $5x^3 + 10x^2 + 10x + 4$

8. The roots of the equation $x^2 - 9x + 20 = 0$ are α and β, where $\alpha > \beta$. Find $\sqrt{\alpha - \beta}$ (A) 3 (B) 1 (C) $\sqrt{3}$ (D) 3

9.

10. The function f is defined by $f = 2x^3 - x^2 - 18 + 9$. If also $f(x) \equiv (x-3)(ax^2 + bx + c)$, find the values of a,b and c (A) $7, 3, -3$ (B) $3, \frac{1}{2}, -3$ (C) $-3, 1, 2$ (D) $2, 5, -3$

11. $k-6, k$ and $k+18$ are successive terms of a geometric series. Which of the following is/are true about k (i) k is even (ii) k is odd (iii) k is prime (A) (i) only (B) (i) and (iii) only (C) (ii) only (D) (ii) and (iii) only

12. For all x, except $x = 1$, $\frac{x^2+1}{x-1}$ equals (A) $x - 1 + \frac{2}{x-1}$ (B) $x + 1 + \frac{1}{x-1}$ (C) $x + 1 + \frac{1}{x-1}$ (D) $x + 1 + \frac{2}{x-1}$
Use for the next two Questions
Functions f and g are defined by $f : x \to \log_a x, (x \in \mathbb{R}_+, a > 1)$; $g : x \to \frac{1}{x}, (x \in \mathbb{R}_+)$

13. State the range of g? (A) $0 \leq x < \infty$ (B) $-1 \leq x \leq 1$ (C) $0 < x \leq 1$ (D) $0 \leq x \leq \frac{1}{2}$

14. Find $f \circ g(x) + f(x)$? (A) 1 (B) 0 (C) 10 (D) cannot be determined

15. Describe the behaviour of each of these sequences (i) $U_n = n(n+1)(n+2)$ (ii) $U_{n+1} = 1 - \frac{1}{1+U_n}$ (iii) $f : n \to \cos(60^0 n), n \in N$ (A) divergent, periodic, convergent (B) convergent, divergent, periodic (C) convergent, periodic, convergent (D) divergent, convergent, periodic

16. State the range of x for which the expansion of is valid (A) $-1 < x < 1$ (B) $-\frac{1}{2} < x < \frac{1}{2}$ (C) $-1 < x < \frac{1}{2}$ (D) $-2 < x < 2$

17. Given the matrix $A = \begin{pmatrix} -1 & -4 \\ 1 & 3 \end{pmatrix}$ (A) $\begin{pmatrix} -1 & -64 \\ 1 & 27 \end{pmatrix}$ (B) $\begin{pmatrix} -5 & -12 \\ 3 & 7 \end{pmatrix}$ (C) $\begin{pmatrix} -1 & -64 \\ 27 & 1 \end{pmatrix}$ (D) $\begin{pmatrix} -9 & -20 \\ 5 & 11 \end{pmatrix}$

18. Solve completely, the equation $\sqrt{(x^2 - 3x)}$ (A)1(B)-1(C)-2(D) $\frac{1}{2}$

19. Find the solution of $x^2 - 2x - 8 \leq 0$ (A) $2 \leq x \leq 4$ (B) $-2 \leq x \leq -4$ (C) $-2 \leq x \leq 4$ (D) $-4 \leq x \leq -2$
Use for the next two Questions

20.

21.

22. Solve $x(x+1)+\frac{12}{x(x+1)}=8$ (A) -3,2,-2,1 (B)3,-2,2,-1 (C) -3,-2,2,-1 (D) 3,-2,-2,1

23. Find the range of values of x for which $2x>\frac{1}{x}$ (A) $x>\frac{1}{\sqrt{2}}$ (B) $-\frac{1}{sqrt2}<x<0$ (C) $0<x<\frac{1}{sqrt2}$ (D) $x<-\frac{1}{sqrt2}$

24. Which of the following is/are not a factor(s) of (

25. The function f is defined by $f:x\to\frac{1}{2-x}$, where $x\neq 2$. Find the inverse function f^{-1} and state its domain (A) $2-x, x\in\mathbb{R}$ (B) $\frac{x}{2x-4}, 0<x<\infty$ (C) $\frac{x-1}{2x}, x\in\mathbb{R}, x\neq 0$ (D) $\frac{2x-1}{x}, x\in\mathbb{R}, x\neq 0$

26. The three real, distinct, and non-zero numbers a,b,c that a,b,c are in arithmetic progression and a,c,b are in geometric progression. If the common ratio r of the series is such that $r<0$. Find in terms of a, the 6th term of the arithmetic progression whose first three terms (A) $\frac{19a}{4}$ (B) $-\frac{11a}{4}$ (C) $-\frac{14a}{4}$ (D) $\frac{3a}{4}$

27. Use mathematical induction to find the sum to n term of the series $1^3+2^3+...+n^3$ (A) $\frac{n}{3}(n+1)(n+2)$ (B) $\frac{1}{3}n^2(3n+1)^2$ (C) $\frac{1}{4}n^2(n+1)^2$ (D) $\frac{n}{4}(n+1)(n+2)(n+3)$

28. Find the first four terms in the expansion of $(1-x)^{-\frac{1}{2}}$ (A) $1+\frac{1}{2}x+\frac{3}{2}x^2+\frac{15}{4}x^3$ (B) $1-\frac{1}{2}x+\frac{3}{2}x^2+\frac{5}{16}x^3$ (C) $-1+\frac{1}{2}x+\frac{5}{2}x^2+\frac{15}{4}x^3$ (D) $1+\frac{1}{2}x+\frac{3}{2}x^2+\frac{15}{48}x^3$

29.

30. Out of the 1000 undergraduate students in the faculty of science 650 are offering Algebra and 500 are offering Trigonometry. How many students are offering bothe Algebra and Trigonometry, if only 210 students are offering neither Algebra or Trigonometry (A) 290 (B) 360 (C) 140 (D) 120

31. If the roots of the equation $x^2-2(p-2)x+2p-10=0$ are real. Find the possible values of p when the roots of the equation differ by 6 (A) -5,-1 (B) 5,1 (C) 5,-1 (D) -5,1

32. If α^2 and β^2 are the roots of $x^2-21x+4=0$ and α and β are both positive. Find the equation with roots $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2}$ (A) $x^2-11x+4=0$ (B) $9x^2-11x-4=0$ (C) $x^2+\frac{2}{9}x+\frac{2}{3}=0$ (D) $9x^2+11x+4=0$

33. Find the range of values of x for which $2|x+1|>|x+1|$ (A) $x>-3$ (B) $x<-\frac{1}{3}$ (C) $-3<x<\frac{1}{3}$ (D) $-\frac{1}{3}<x<3$

34.

35. Given that $|x|\neq 1$, find the complete solutions for which $\frac{x}{x-1}>\frac{1}{x+1}$ (A) $-1<x<1$ (B) $x>-1$ (C) $x>1$ (D) $x<1$

36. Find the value of $\sum_{r=1}^{\infty}\frac{k}{10^r}$ (A) $\frac{k}{90}$ (B) $\frac{k}{10}$ (C) $\frac{10}{9}$ (D) $\frac{k}{9}$

37.

38.

39. Find the term x^5 in the expansion of $(1+x)^{10}$ (A) $120x^5$ (B) $252x^5$ (C) $720x65$ (D) $144x^5$

40. The roots of the quadratic equation $x^2+2x+3=0$ are denoted by α,β. Without solving the equation. Find the quadratic equation whose roots are $\alpha+\frac{1}{\beta},\beta+\frac{1}{\alpha}$ (A) $x^2-4x+5=0$ (B) $x^2-4x-5=0$ (C) $3x^2+8x+16=0$ (D) $3x^2-8x+1=0$

41. It is given that $\frac{1}{b+c},\frac{1}{c+a},\frac{1}{a+b}$ are three consecutive terms of an arithmetic series. Which of the following statements is/are true of the series.
(i) a^2,b^2,c^2 are also three consecutive terms of an arithmetic series.
(ii) The common difference is $\frac{(c-b)}{(b+a)(c+a)}$
(iii) The sum of its four terms is $\frac{1-3(a-b)}{(b+c)}$
(A) (i) only (B) (i) and (ii) only (C) (i) and (iii) only (D) (i),(ii) and (iii)

42. The function f and g defined by $f(x)=x^3-2x-5x+6$ and $g(x)=x-1$. Find $f\circ g(x)$ (A) x^3-2x^2-5x+5 (B) x^3-2x^2-5x+7 (C) x^3-5x^2-2x+8 (D) x^3-5x^2-2x+7

43. Find the inverse of the matrix $A=\begin{pmatrix}2&4&3\\1&-2&-2\\-3&3&2\end{pmatrix}$ (A) $\frac{1}{11}\begin{pmatrix}2&1&-2\\4&13&7\\-3&-18&-8\end{pmatrix}$ (B) $\frac{1}{11}\begin{pmatrix}2&4&-3\\1&13&-18\\-2&7&-8\end{pmatrix}$ (C) $\frac{1}{11}\begin{pmatrix}2&1&-2\\4&-2&3\\3&-2&2\end{pmatrix}$ (D) $\frac{1}{-21}\begin{pmatrix}2&4&-3\\1&13&-18\\-2&7&-8\end{pmatrix}$

Lagos State University
Faculty Of Science
Department of Mathematics
Harmattan Semester Examination :: 2014/2015 Session

MAT 111 - Trigonometry

Time Allowed: $1\frac{1}{2}$Hours OPTION 3 **REPRODUCED BY BUNDAY TUTORIAL**
Instruction: *Answer All questions. Shade Option E where none of options A,B,C,D is Correct.*

1. Find without using tables, the value of $\cos 80^0 \cos 20^0 + \sin 80^0 \sin 20^0$ (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) $\frac{1}{5}$
2. If $\sin\theta = \frac{1}{\sqrt{3}}$ and θ is obtuse, find $\tan\theta$ (A) $\frac{1}{\sqrt{2}}$ (B) $-\frac{1}{\sqrt{2}}$ (C) $\frac{1}{\sqrt{5}}$ (D) $-\frac{1}{\sqrt{5}}$
3. If $t = \tan\frac{1}{2}\theta$, express $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$ in terms of t (A) $t^2 + 8t + 8$ (B) $(3t^2 - 1)^7$ (C) $\frac{t^2+8t+8}{(3t^2-1)^7}$ (D) $\frac{t+1}{t-1}$
4. The general solution of $\tan 2x = \cot 5x$ is given by (A) $n180^0$ (B) $(n+1)180^0$ (C) $(n+2)180^0$ (D) $(2n+1)180^0$
5. Solve for θ in the range 0^0 and 90^0 given that $6\sin\theta = \tan\theta$ (A) $0^0, 80^0 24'$ (B) $45^0, 80^0 24'$ (C) $68^0, 80^0 36'$ (D) $60^0, 80^0 36'$
6. Given that $x = r\sin\theta\cos\phi$, $y = r\sin\theta\sin\phi$, $z = r\cos\theta$, then (A) $r = x+y+z$ (B) $x-y = r-z$ (C) $r = \frac{1}{x^2+y^2+z^2}$ (D) $r = x^2 + y^2 + z^2$
7. Solve for θ in the range 0^0 and 90^0 given that $6\sin\theta = \tan\theta$ (A) $0^0, 80^0 24'$ (B) $45^0, 80^0 24'$ (C) $68^0, 80^0 36'$ (D) $60^0, 80^0 36'$
8. The general solution of $\cos x = \alpha$ is given by (A) $x = n360^0 \pm \theta$ (B) $x = n180^0 \pm \theta$ (C) $x = n180^0 + (-1)^n\theta$ (D) $x = n270^0 \pm \theta$
9. Evaluate $\cos 75^0$ without using tables (A) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{2\sqrt{2}}{3}$ (D) $\frac{1}{4}$
10. The general solution of $\sin x = \alpha$ is given by (A) $x = n360^0 \pm \theta$ (B) $x = n180^0 \pm \theta$ (C) $x = n180^0 + (-1)^n\theta$ (D) $x = n270^0 \pm \theta$
11. Find the value of $\tan(\theta - \phi)$, given that $\tan\theta = \sqrt{3}$ and $\tan\phi = \frac{1}{\sqrt{3}}$ (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$
12. Solve the equation $y = 2\cos^{-1}(\frac{x}{3})$ for x (A) $3\cos(\frac{y}{2})$ (B) $\cos(\frac{3y}{2})$ (C) $3\cos(\frac{2y}{3})$ (D) $\cos(\frac{y}{2})$
13. Simplify $\frac{\sin^3 x + \cos^3 x}{\sin x + \cos x}$ (A) $1 - \frac{1}{2}\sin 2x$ (B) $1 + \frac{1}{2}\cos 2x$ (C) $\cos 3x$ (D) $\sin 2x$
14. Simplify $\sin(\theta + 30)^0 + \cos(\theta + 60)^0$ (A) $\sin\theta$ (B) $\frac{1}{2}\cos\theta$ (C) $\frac{1}{2}\sin\theta$ (D) $\cos\theta$
15. Simplify $\frac{\sin^2 x}{(1+\cos x)}\frac{\sin^2 x}{(1-\cos x)}$ (A) $\sin x$ (B) $\cos^2 x$ (C) $\sin^2 x$ (D)2
16. If $\sin\theta = \frac{x}{y}$ and $0^0 < \theta < 90^0$, find $\frac{1}{\tan\theta}$ (A) $\frac{\sqrt{y^2-x^2}}{x}$ (B) $\frac{x^2}{\sqrt{y^2-x^2}}$ (C) $\frac{x}{\sqrt{y^2-x^2}}$ (D) $\frac{y}{x}$
17. If $\sin = \frac{m-n}{m+n}$, find the value of $1 + \tan^2\theta$ (A) $\frac{2(m^2+n^2)}{m+n}$ (B) $\frac{\sqrt{2(m^2+n^2)}}{m+n}$ (C) $\frac{m^2+n^2+2mn}{2mn}$ (D) $\frac{m^2+n^2+2mn}{4mn}$
18. Simplify $\cos(\arcsin\frac{3}{5})$ (A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{3}{4}$ (D) $\frac{5}{4}$
19. Simplify $\cos(\arctan\frac{15}{8} - \arcsin\frac{4}{5})$ (A) $\frac{297}{425}$ (B) $\frac{284}{425}$ (C) $\frac{105}{425}$ (D) $\frac{425}{297}$
20. Simplify $\sin(\arcsin\frac{12}{13} - \arcsin\frac{4}{5})$ (A) $\frac{56}{65}$ (B) $\frac{20}{65}$ (C) $\frac{36}{65}$ (D) $\frac{65}{56}$
21. Simplify $\sin(A+B)\sin(A-B)$ (A) $\sin^2 B - \sin^2 A$ (B) $\sin^2 A - \sin^2 B$ (C) $\sin^2 A$ (D) $\sin^2(A+B)$
22. Simplify $\sin(2\arctan 3)$ (A) $\frac{297}{425}$ (B) $\frac{284}{425}$ (C) $\frac{105}{425}$ (D) $\frac{425}{297}$
23. Write the expression $\cos 4x - \cos 2x$ as a product of a trigonometry function (A) $\cos 3x\cos x$ (B) $-2\sin 3x\sin x$ (C) $\sin 6x\sin 2x$ (D) $-\cos 4x\cos 2x$
24. If $\frac{\tan 6x}{1-\tan^2 6x} = k\tan tx$, what are the values of k and t (A) 1 and 6 (B) 3 and 18 (C) 2 and 12 (D) 4 and 24
25. Given that $5 - 5\cos 8x = a\sin^2 bx$, find a and b that validate the equality (A) 10 and 4 (B) 5 and 2 (C) 15 and 6 (D) 20 and 8

26. Simplify $(1+\cot\theta-\csc\theta)(1+\tan\theta+\sec\theta)$ (A) 2 (B) 1 (C) 0 (D) $\sin\theta\cos\theta$

27. If $t=\tan\frac{1}{2}\theta$, express $3\cos\theta+4\sin\theta+5$ in terms of t (A) $\frac{2(t+2)^2}{(1+t^2)}$ (B) $2(t+2)^2$ (C) $1+t^2$ (D) $3\sqrt{t}+4t^{\frac{1}{3}}$

28. Simplify $5\sin\theta-20\sin^3\theta$ (A) $\sin 3\theta$ (B) $\cos 5\theta$ (C) $\sin 5\theta$ (D) $\cos 3\theta$

29. If $\sin\theta=\frac{1}{\sqrt{3}}$ and θ is obtuse, find $\tan\theta$ (A) $\frac{1}{\sqrt{2}}$ (B) $-\frac{1}{\sqrt{2}}$ (C) $\frac{1}{\sqrt{5}}$ (D) $-\frac{1}{\sqrt{5}}$

30. Given that $x=r\sin\theta\cos\phi$, $y=r\sin\theta\sin\phi$, $z=r\cos\theta$, then (A) $r=x+y+z$ (B) $x-y=r-z$ (C) $r=\frac{1}{x^2+y^2+z^2}$ (D) $r=x^2+y^2+z^2$

31. The general solution of $\cos x=\alpha$ is given by (A) $x=n360^0\pm\theta$ (B) $x=n180^0\pm\theta$ (C) $x=n180^0+(-1)^n\theta$ (D) $x=n270^0\pm\theta$

32. Solve for θ in the range 0^0 and 90^0 given that $6\sin\theta=\tan\theta$ (A) $0^0, 80^0 24'$ (B) $45^0, 80^0 24'$ (C) $68^0, 80^0 36'$ (D) $60^0, 80^0 36'$

33. If $t=\tan\frac{1}{2}\theta$, express $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}$ in terms of t (A) t^2+8t+8 (B) $(3t^2-1)^7$ (C) $\frac{t^2+8t+8}{(3t^2-1)^7}$ (D) $\frac{t+1}{t-1}$

34. Evaluate $\cos 75^0$ without using tables (A) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\frac{2\sqrt{2}}{3}$ (D) $\frac{1}{4}$

35. The general solution of $\sin x=\alpha$ is given by (A) $x=n360^0\pm\theta$ (B) $x=n180^0\pm\theta$ (C) $x=n180^0+(-1)^n\theta$ (D) $x=n270^0\pm\theta$

36. Simplify $\sin(270^0-\theta)+\sin(270^0+\theta)$ (A) $-2\cos\theta$ (B) $2\sin 2\theta$ (C) $2\cos 2\theta$ (D) $\sin\theta$

37. Find the value of $\tan(\theta-\phi)$, given that $\tan\theta=\sqrt{3}$ and $\tan\phi=\frac{1}{\sqrt{3}}$ (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

38. Solve the equation $y=2\cos^{-1}(\frac{x}{3})$ for x (A) $3\cos(\frac{y}{2})$ (B) $\cos(\frac{3y}{2})$ (C) $3\cos(\frac{2y}{3})$ (D) $\cos(\frac{y}{2})$

39. Suppose a tree 50 feet in height casts a shadow of length 60 feet. What is the angle of elevation from the end of the shadow to the top of the tree with respect to the ground? (A) 49.8^0 (B) 48.9^0 (C) 38.9^0 (D) 39.8^0

40. Simplify $\sin(\theta+30^0)+\cos(\theta+60^0)$ (A) $\sin\theta$ (B) $\frac{1}{2}\cos\theta$ (C) $\frac{1}{2}\sin\theta$ (D) $\cos\theta$

41. Simplify $\frac{\sin^3 x+\cos^3 x}{\sin x+\cos x}$ (A) $1-\frac{1}{2}\sin 2x$ (B) $1+\frac{1}{2}\cos 2x$ (C) $\cos 3x$ (D) $\sin 2x$

42. Simplify $\frac{\sin^2 x}{(1+\cos x)}\frac{\sin^2 x}{(1-\cos x)}$ (A) $\sin x$ (B) $\cos^2 x$ (C) $\sin^2 x$ (D)2

43. If $\sin\theta=\frac{x}{y}$ and $0^0<\theta<90^0$, find $\frac{1}{\tan\theta}$ (A) $\frac{\sqrt{y^2-x^2}}{x}$ (B) $\frac{x^2}{\sqrt{y^2-x^2}}$ (C) $\frac{x}{\sqrt{y^2-x^2}}$ (D) $\frac{y}{x}$

44. If $\sin=\frac{m-n}{m+n}$, find the value of $1+\tan^2\theta$ (A) $\frac{2(m^2+n^2)}{m+n}$ (B) $\frac{\sqrt{2(m^2+n^2)}}{m+n}$ (C) $\frac{m^2+n^2+2mn}{2mn}$ (D) $\frac{m^2+n^2+2mn}{4mn}$

45. Simplify $\cos(\arcsin\frac{3}{5})$ (A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{3}{4}$ (D) $\frac{5}{4}$

46. Simplify $\cos(\arctan\frac{15}{8}-\arcsin\frac{4}{5})$ (A) $\frac{297}{425}$ (B) $\frac{284}{425}$ (C) $\frac{105}{425}$ (D) $\frac{425}{297}$

47. Simplify $\sin(\arcsin\frac{12}{13}-\arcsin\frac{4}{5})$ (A) $\frac{56}{65}$ (B) $\frac{20}{65}$ (C) $\frac{36}{65}$ (D) $\frac{65}{56}$

48. Simplify $(1+\cot\theta-\csc\theta)(1+\tan\theta+\sec\theta)$ (A) 2 (B) 1 (C) 0 (D) $\sin\theta\cos\theta$

49. Simplify $\sin(2\arctan 3)$ (A) $\frac{297}{425}$ (B) $\frac{284}{425}$ (C) $\frac{105}{425}$ (D) $\frac{425}{297}$

50. Write the expression $\cos 4x-\cos 2x$ as a product of a trigonometry function (A) $\cos 3x\cos x$ (B) $-2\sin 3x\sin x$ (C) $\sin 6x\sin 2x$ (D) $-\cos 4x\cos 2x$

51. If $t=\tan\frac{1}{2}\theta$, express $3\cos\theta+4\sin\theta+5$ in terms of t (A) $\frac{2(t+2)^2}{(1+t^2)}$ (B) $2(t+2)^2$ (C) $1+t^2$ (D) $3\sqrt{t}+4t^{\frac{1}{3}}$

52. If $\frac{\tan 6x}{1-\tan^2 6x}=k\tan tx$, what are the values of k and t (A) 1 and 6 (B) 3 and 18 (C) 2 and 12 (D) 4 and 24