1 f(x) is function, for x>0 lnf(x)=ln2-ln(x), find f'(x)

2 T1 is a equilateral triangle with side length 1. T2 is a triangle whose vertices are the midpoints of T1's sides. Find the area of T2. inter

3 A B C are three sets. |A|=17, |B|=15, |C|=20, |A \cap B|=10, |A \cap C|=4, |C \cap B|=2, |A \cap B \cap C|=1, find |A \cup B \cup C|

4 Given that int(exp(-x^2), x=0..infinity)=sqrt(Pi)/2, a>0, find int(exp(-x^2/a^2), x=0..infinity)

5 A bag contains 4 green balls and 5 black balls. One picks two balls randomly from it without putting back. Find the probability of picking two green balls.

6 f(x,y) is continuous, int((int(f(x,y),y=0..x^2))x=0..2)= what (exchange the order of the two integrals)

7 f(x)=int((t^2-1)/(t^2+1),t=0..x), what is the set of the critical points of f(x)?

8 In a vector space with inner product <a,b> and norm ||a||, a,b,c are vectors, <a,b>=2, <b,c>=5, <a,c>=-3, ||a||=1, ||b||=2, ||c||=7. Find <a+b,b+c>

9 What the graph of y=3x^4-4x^3+1 like?

10 Which function is not even?
(a) f(x)=sin(xsin(x)) (b) f(x)=sin(cos(x)) (c) f(x)=cos(sin(x)) (d) f(x)=exp(cos(x))-exp(cos(-x)) (e) f(x)=cos(exp(2x))

11 M2 is the vector space of all 2*2 matrices with real entries. For what real number r the set {(a b)(c d)|a+b+c+d=r} is a subspace of M2 ?

12 Find int(sqrt(exp(x)+exp(-x)+2),x=0..1)

13 Find the congruence of 4^578 (mod 7)

14 ABCD is a quadralateral, AB=BC=3, AD=DC=4, BD=5. find AC

15 f and g are bijections from interval [0,1] to itself. which map must be an one-to-one map?
(a) f+g (b)f-g (c) f*g (d) (f^2+g^2)/2 (e) f(g)

16 一张边长 24 的正方形纸，四个角各剪掉一个边长为 h 的正方形，剩下的部分可以折成一个无盖的长方体，求 h 使长方体体积最大。

17 A and B are two invertible 5*5 matrices, B^T is the transposition of B. X is a 5*1 vector. Which statement must be true?

I. (B^T)A is invertible
II. the equation BX=AX has only the trivial solution X=0.
III. the dimension of the column space of A equals to the dimension of the column space of B

18 g is a twice-differentiable function, g(0)=g'(0)=g"(0)=1, f(x)=g(x^2)+g(x)+1, find f"(0)

19 f is a function that is differentiable at 0, find lim(x->0, [f(x^5)-f(0)]/2x^3)

20 the graph of the derivative g'(x) of function y=g(x) has the graph as follows（题目给了图，我没法画，用解析式表示大概是）：当 x 不大于 2，g'(x)=x-1；当 2《x《3，g'(x)=3-x；当 3《x《4，g'(x)=x-3；当 x 不小于 4，g'(x)=5-x. Which one is not true
(a) g has a local minimum at x=1 (b) g has a local maximum at x=2 (c) g has an inflection point at x=3 (d) g has an inflection point at x=4 (e) g has an absolute maximum at x=5

21 Given that the 3*3 matrix: (three row vectors are (0,0,-2),(1,2,1),(1,0,3)
, respectively) has an eigenvalue of 2, find a base of the subspace of eigenvectors corresponding to 2.

22 On a curve r=r(t)(r 是向量)， a point is regular if dr/dt is not zero vector. Then how many points on the curve x(t)=[sin(t)]^3, y(t)=[cos(t)]^3 are not regular?
ditons

23 Let z=x+iy, x and y are real numbers. f(z)=6x-4y+i(ax+by), a and b are real numbers. If f(z) is differentiable, find a and b.

24 a,b,c belongs to interval [0,1] and a<b<c. Which function's graph satisfy the following conditions: (1) f is nonnegative; (2) int(f(x),x=a..b)=int(f(x),x=a..c); (3) f(a)=f(c) 图像就不画了，反正很简单。

25 z=x+iy, x>0 and y>0. If z^2=-1/2+i*sqrt(3)/2, then z^3+2z+1=?

26 {a_n} is a sequence, a_0=0,a_1=1, a_(n+1)=a_n+2*a_(n-1) for n>=1. Find lim(n->infinity, a_(n+1)/a_n)

27 Let A be the area of the triangle formed by x-axle, y-axle and the tangent line of y=x^p (p<0) at x=c. Find p such that A is independent of c.

28 Given that x-2y+3z=1, find the minimum value of x^2+y^2+z^2

29 P(x) is a quadratic polynomial of x that has the same value as sin(x) at x=0,x=Pi/4 and x=Pi/2. Find P(Pi)

30 For real x, let f(x)=lim(n->infinity, [cos(x)]^2n). Then what about the continuity of f(x).（选项不列了，就是问 f 在哪些点连续）

31 For real x, let f(x)=x-[x], i.e., f is the fractional part of x. If a and b are real numbers and b=a+1, find the image of f on interval [a,b].

32 G(x)=int(exp(-t^2),t=0..x^2), find G'(x)

33 老师给 12 个孩子分 12 个玩具，每人 1 个。只有 4 种不同的玩具，每种分别有 4，5，2，1 个，问有多少种分配的方法。

34 Find the \capion point of plane 3x+2y-z=5 and line x=1+2t,y=-1-t,z=-3t.

35 Find the mean value of function f(x)=xe^3x on interval [0,2]

36 S and T are nonzero 3*3 matrices. Which of the following cannot be true?
(A) ST=0 (B) ST<>TS (C) ST=ST^2 (D) T=T^4 (E) S^4=0 but S^3<>0 ("<>" means "not equal to")

37 {a_n} is a strictly increasing sequence of positive numbers, which of the following sum must converge?
I. sum(1/(a_i)^2, i=1..infinity)
II. sum((a_i)/(a_(i+1)), i=1..infinity)
III. sum(exp(-a_i), i=1..infinity)

38 a=(a1,a2,a3) is a nonzero vector. S is the linear transformation from R^3 to R^3 such that S(x)=a×x(差乘) for all vector x. Find the determinant of S.

39 P 和 Q 是命题，则“非（P 且 Q）”等价于以下哪个？ 答案：P 蕴含非 Q

40 Which set is not the \capion of countably many open sets?
(a) Z (b) Q (c) interval [0,infinity) (d) the complement of Q (e) the complement of Z

42 h is a continuous function on interval [a,b] and h(x) belongs in Q for all x. Which statement is true?
(a) h is constant on the interval 后面的选项忘了

43 直线 y=1000x 与 y=999x 的夹角用弧度表示最接近哪个选项？ 10^-2 10^-3 10^-4 10^-5 10^-6

44 Find sum([(-1)^n]*(n+1)/n!,n=0..infinity)

46 n>=3,k is real number, sum((a_i)^3,i=1..n) <= k*sqrt(sum((a_i)^6,i=1..n)) for all real numbers {a_i}. Find the minimum value of k.

47 C is the circle x^2+y^2=9, oriented counterclockwise, find 沿 C 的线积分

（exp(Pi*z)/(z-4i)^2/(z-i) dz）.

48 For a commutative ring M and ideal A, let N(A)={x in M|there exists a nonnegative integer n such that x^n in A}. Which of following is true for N(A)=A?
I. M=Z, A=(2)
II. M=Z[x], A=(x^2+2)
III. M=Z/27Z, A=(18+27Z)

49 X 和 Y 两个正态分布，前者期望是 52，标准差是 6；后者期望是 40，标准差是 8。求 Z=X+Y 的标准差

50 对不小于 3 的正整数 n，求单位圆的外切正 n 边形与内接正 n 边形的周长之比。

How many distict real root does the equation x^4-x^3*sin(x)-x^2*cos(x)=0 have? 0 1 2
3 4

有多少个互不同构的 3^2*11^4*17 阶 Abel 群？

Ta 是以点(0,0),(1,0),(0,a)为顶点的三角形，F（a）是函数 f(x,y)=y^2 在 Ta 上的积分，求 F'(1)

55 The solution y(x) of y"+6y'+cy=0 satisfies that lim(x->positive infinity, y(x))=0, find all valid c:
(a) c<=0 (b) c>0 (c) 0<c<=9 (d) c>=9 (e) R

56 Line y=x is tangant to a circle at (3,3) and line y=2x passes the center of that circle. Which circle is possible?
Answer: (a) (x-2)^2+(y-4)^2=2

57 X is a compact metric space, f is a continuous function X->X. Which of the following must be true?
I. f has fixed point
II. f is uniformly continuous
III. f is a closed map

59 G is a group, a and b are non-unit elements of G, ab=bba. If the subgroup of G generated by a has order 3, what about the order of the subgroup of G generated by b?
(a) 3 (b) 5 (c) 7 (d) 9 (e) cannot determined by given information

66 Find int([sin(t)]^3/{[sin(t)]^3+[cos(t)]^3},t=0..Pi/2)