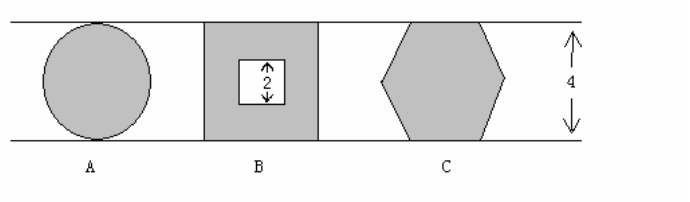
前言：本来考完了就不太想回忆题了，觉得意义不大。但经过一天的休息，发现题目不但没忘光反而还能记起不少，再想想考前找资料的困难，决定还是写出来……这一下就弄出来了30 多道，不过大多残缺不全（题目前有*的为最不清楚的），也就只能这样了。

————GFinger@smth, 11/14/2004

1、$\lim_{x\to\infty}\frac{x-\sin x}{x^3}=$

2、A is a circle, B is a square, C is a hexagon



从小到大排列它们的面积

3、If $f''(0)<0$ for all real x,

I. $f(0)>0\Rightarrow f(1)\geq 0$; II. $f'(2)>f'(3)$; III. $f(4)=f(5)\Rightarrow f(6)<f(7)$

Which of them are correct?

4、$f:X\to Y$ is continuous bijection,

I. if X is compact then Y is compact

II. if X is Hausdorff space then Y is Hausdorff space

III. if X is compact and Y is Hausdorff space then f^{-1} exist

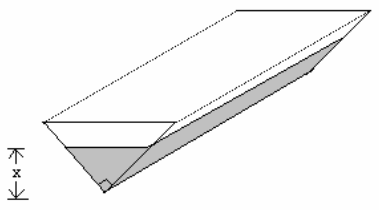
Which of them are correct?

*5、T, S are both linear transformation on $\mathbb{R}^n\to\mathbb{R}^n$, TS=ST

I. ? II. W is the set of eigenvalues of T, then S(W)$\subseteq$W III.?

Which of them are correct?

6、the length is 5 meter, the side face is an isoceles right triangle; the velocity is 1 cubic meter/second, then what is the velocity relative to height x when x=0.25?



7、 $f_1(x)=kx^2+4$， $f_2(x)=k^2-x^2$, how many k can make f_1 and f_2 orthogonal on their graphs?

8、$n\in\{3,4,5,6,7,8,9,10,11\}$, which n make $\mathbb{Z}_n$ have unique structure (up to isomorphism)?

9、Which is a semi-group but not a group?

A. $\mathbb{R}, x*y=\dfrac{x}{y}$

B. all irrational numbers, multiplication

C. all continuous functions f on $\mathbb{R}$,composition

D. all 2*2 matrices with determinant=1, multiplication

E. all polynomials whose coefficients are integers and degree no more than 5

10、$C=\{e^{\theta i}:0\le\theta\le\pi\}$, $\int_C(1+2z+3z^2+4z^3)dz=$

11、$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}}(\cos t+\sqrt{1+t^2}\sin^3 t\cos^3 t)dt=$

12、f is strictly increasing, then which is necessarily WRONG?

A. $\forall x\ f(2x)=2f(x)$ C. $\int_0^1 f(x)dx=\int_1^2 f(x)dx$ D. $\lim_{x\to\infty} f'(x)=0$ E. $f'(1)=-f'(2)$

13、How many 4-vertices connective graphs not including a triangle?

14、input(n)

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while (i<n)
  i=i+1
  k=n
    while (i<=k)
      if i=k print(i)
      else k=k-1
    end
end
```

If input n=88, what will be print?

15、the coefficient of x^{50} in $(\sum_{n=1}^{\infty}x^n)^3$?

16、the derivative of $\sum_{n=1}^{\infty}\dfrac{x^n}{n}$?

*17、which of the equations below has the most real solutions?

A. 三次方程（只有一个实根） B. 二次方程(a>0&c<0) C.一次方程

D. $x=e^x$ E. $\cos x=e^{x^2}$

18、f is continuous function

I. $\{f(x): 0 < x < 1\}$ is open II. $\{f(x): 2 \le x \le 3\}$ is closed

III. $\{f(x): 4 < x \le 5\}$ is connective

Which of them are correct?

19、Which is independent of $(1,2,3)^T, (4,5,6)^T, (7,8,9)^T$?

A. $(0,0,0)^T$ B. $(1,0,1)^T$ C. $(1,1,1)^T$ D. $(2,4,6)^T$ E. $(3,5,7)^T$

20、select 2 elements randomly in {1,2,3,4,5,6,7,8}, the probability of that the sum of them is divided by 3 is ?

21、X, Y are both random variables of uniform distribution, $0 \le X \le 3, 0 \le Y \le 4$,then the probability of X<Y is?

22、p, q, r are prime numbers (larger than 100)

I. $3 \mid p^2 + q^2 + r^2$ II. $q \mid p^5$ III. There exist integers x, y satisfied $px + qy = r$

Which of them are correct?

23、$f: X \to Y$ $g: Y \to Z$ if $g \circ f: X \to Z$ is one to one, then which must be correct?

A f is one to one B. f is onto C. g is one to one D. g is onto

24、a, b∈ group G, both have finite orders
I. if ab=ba, then ab has finite order
II. if ab has finite order, then ba has finite order
III. if ab has finite order, then $a^{-1}b^{-1}$ has finite order
Which of them are correct?

25、define a relation ♥ on the set S, which satisfy:

(i) $\forall a \in S$, a ♥b; (ii) $\exists c \in S$, s.t. if b ♥a then a=c

Then:
A. b=c B. b≠c C. S has only one element D. S has more than one elements

*26、$\forall \varepsilon > 0, \exists \delta > 0$, s.t. $| f(x) - f(x_0) | > \varepsilon$ whenever $| x - x_0 | > \delta$

equivalent to:

C. f is unbound D. $\lim_{|x|\to\infty} |f(x)| = \infty$

27、find a set of orthogonal basis of the column space $\begin{pmatrix} 1 & -1 & -2 & 3 \\ -1 & 1 & 3 & -2 \\ 2 & -2 & -5 & 5 \end{pmatrix}$

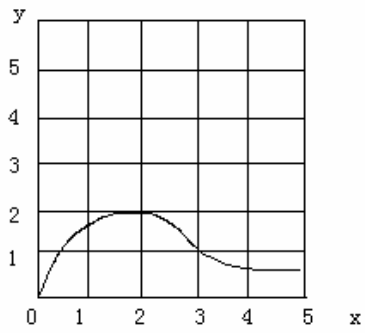
28、$(1-x^2)y'' - xy' + y = 0$ if $x = \sin t$ then determine the new equation

29、find the relative maximum point in [0, π] of the function: $\int_0^x e^t \sin(2t)dt$

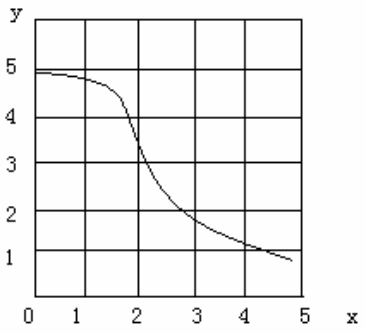
30、
$f''(x) < 0, f'(0) = 0$
$T = f(0) + 2f(2) + 2f(4) + f(6)$
$I = \int_0^6 f(x)dx$
$R = 2f(2) + 2f(4) + 2f(6)$
从小到大排列 T, I, R

31、choose the graph of $f(x) = (1 + \frac{1}{x})^x$

32、the graph of f and g are below:



y=f(x)



y=g(x)

Which of the following is largest?