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Feng County National High School (1st Year) Midterm Practice Test

1. The listing method of the set $\{x \mid (x+1)(x-2)(x^2+1)=0, x \in R\}$ can be expressed as ______.

2. The range of the equation $f(x)=2x+3$ is $\{-1, 2, 5, 8\}$, the domain is $\{$ ______ $\}$

3. If $f(2x)=3x^2+1$, then the equation of $f(x)$ is ______.

4. If Set A ~~st~~ Satisfy $\{1\} \cup A = \{1, 3, 5\}$, then Set $A=$ ______.

5. The graph of $f(x)=a^{x-1}-3$ must pass the fixed point ______.

6. $f(x)=\begin{cases} 2 & x \le 0 \\ 3x^2-4, & x>0 \end{cases}$ then $f(f(-2))=$ ______.

7. If $A=[1,4)$, $B=(-\infty, a)$, if $A \subseteq B$, then the domain of real number a is ______.

8. $a=0.3^2$, $b=2^{0.3}$, $c=\log_{0.3}2$, list a, b, c from the smallest to the largest ______.

9. $U=\{1, 2, 3, 4, 5\}$, $A \cap (C_U B)=\{1\}$, $B \cap (C_U A)=\{5\}$, $(C_U A) \cap (C_U B)=\{2\}$, then set $A=$ ______.

10. Function $y=-x^2+4ax$ is ~~absoultly~~ absolutely increasing on the interval $[1,3]$, then the domain of real number a is ______.

11. $F(x)$ is an odd function, then $f(\sqrt{3}+2)+f\left(\frac{1}{\sqrt{3}-2}\right)=$ ______.

12. The range of $f(x)=\dfrac{x^2}{x^2+10}$ $(x \in R)$ is ______.

13. Suppose positive integer m satisfies $10^{m-1} < 2^{512} < 10^{m}$, then $m=$ ________ ($\lg 2 \approx 0.3010$).

14. $y=x$ is the line of Symmetry of $f(x)=(\frac{1}{2})^{x}$ and $g(x)$, let $h(x)=g(1-|x|)$, then $h(x)$ has the following charistics:

(1) The Symmetry for $h(x)$ is the origin (2) $h(x)$ is even

(3) The minimum value for $h(x)$ is 0

(4) $h(x)$ is decreasing on the interval $(0,1)$

The correct statement is ________. (fill in all the correct #s)

15. Set $A=\{-1, a^2+1, a^2-3\}$, $B=\{-4, a-1, a+1\}$, and $A \cap B=\{-2\}$ find the value of a.

16. Compute: (1) $(2\frac{3}{5})^{0}+2^{-2}\cdot(2\frac{1}{4})^{-\frac{1}{2}}-(0.01)^{0.5}$

(2) $2^{3\log_2 4}+3^{\log_2 1}-\log_{10}3\cdot\log_3 2-\log 5$

17. α, β are two zeros of $y=x^2-2kx+6$.

(1) Find the equation of $f(k)=(\alpha-1)^2+(\beta-1)^2$, and find the domain.

(2) Find the minimum value of $f(k)$ and find k's value when $f(k)$ has a minimum value.

18. $F(x)=ax^2+bx+cx$, ~~inequality~~ the solution of the inequality $f(x)>-2x$ is $(1,3)$

(I) If $f(x)+6a=0$ has 2 equal real roots, find the equation for $f(x)$.

(II). If the maximum value of $f(x)$ is a positive number, find the range of a.

19. The value y (dollars) of a diamond and the square of it's Weight x (in carats) are positively corelated, a 3 carats of the diamond is \$54,000.

(I) Write a function of y in term of x.

(II). If cut the diamand into 2 piece according to 1:3, find the percentage of loss.

(III) If cut the diamond into 2 pieces, and the weight of the 2 pieces are m carats and n carats, prove: when $m=n$, the percentage of loss is the greatest.

(Note: Percentage of loss $= \dfrac{\text{Origin Value} - \text{Present value}}{\text{Origin Value}} \times 100\%$)

20. If function $f(x)$ of ~~denif~~ definition D Satisfies: for any $x \in D$, there exists a constant $M>0$, and $|f(x)| \leq M$ exists, then $f(x)$ is a limit function of D, then M is the upper limit of $f(x)$.

Knowing that $f(x) = 1 + a\left(\frac{1}{2}\right)^x + \left(\frac{1}{4}\right)^x$; $g(x) = \dfrac{1-m\cdot 2^x}{1+m\cdot 2^x}$

(1) When $a=1$, find the range of $f(x)$ in the interval of $(-\infty, 0)$, and tell if $f(x)$ in the interval $(-\infty, 0)$ is an upper limit function and explain the reason.

(2) If 3 is the upper limit of $f(x)$ in the interval $[0, +\infty)$, find the domain of the real number a.

<3> If $m>0$, the upper limit of $g(x)$ in the interval $[0, 1]$ is $T(m)$, find ~~$T(m)$~~ the domain of $T(m)$.

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Third Year Math Exercises (High School)

1. Given the top of probala C is the origin, it's ~~foci~~ focus is on x-axis, line $y=x$ and the probala C intercept at two points A and B. If $P(2,2)$ is the midpoint of AB, then the equation of Probala C is ________.

2. In $\triangle ABC$, $\vec{AB}\cdot\vec{BC}=3$, $\triangle ABC$'s surface area $S_{\triangle ABC}\in\left[\frac{\sqrt{3}}{2},\frac{3}{2}\right]$, then the range of the angle between $\vec{AB}$ and $\vec{BC}$ is ________.

3. Suppose the focus of Probala $y^2=2px$ $(p>0)$ is F, point A $(0,2)$. If line segment's midpoint B is on the probala, then the distance from B to the dirctrix of the probala is ________.

4. Given that the distance between the moving point P and fixed point $(2,0)$ and the distance between P and straight line $L: x=-2$ are equal, then point P's equation is ________.

5. In rectangle system xoy, Suppose $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ $(a>b>0)$ the focus is $2c$. From O as the center make a circle M with radius a. If the 2 tegents lines passing $P(\frac{a^2}{c},0)$ and the circle M are perpendicular, then the eccentricity of ~~the~~ $\frac{x^2}{a}+\frac{y^2}{b}=1$ is ____.

6. Make a straight line passing through $(0,1)$. The line share only one common point with probala $y^2=4x$. ~~Th~~ How many such lines exist?

7. Line $y=b$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ intersect at two points A and B, $\angle AOB=90^\circ$ (O is the origin). The slope of the asymptote is ____.

High School (3 year) Exercises

8. P is a point on the left curve of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $(a>0, b>0)$. F_1, F_2 are the left and right foci. $\overrightarrow{PF_1} \cdot \overrightarrow{PF_2} = 0$, $\tan\angle PF_2F_1 = \frac{2}{3}$, the eccentricity of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is ______.

9. Given piecewise defined $\begin{cases} x \geq 0,\ y \geq 0 \\ y \leq -2x + 2\sqrt{2} \\ y \leq kx + \sqrt{2} \end{cases}$, the range D is ~~can~~ completely covered by a circle with radius 1, then the range of the real number **K** is ____.

10. From the moving point P toward $\frac{x^2}{4} + y^2 = 1$ make 2 tegent lines PA, PB. The points of tengency are A, B, $\angle APB = 90°$, the equation of the moving point P is ____.

11. The line passes through the focus of $y^2 = 4x$ intersects the probala in 2 points A, B, passing B make a perpendicular line to the dirctrix L, the point of intersection is C. Given $A(4,4)$, then line AC's equation is ______.

12. O is the origin for $y^2 = 4x$, A, B are two moving points on the probala, $OA \perp OB$, when line AB's angle is 45°, the surface area of $\triangle AOB$ is ______.

13. Given $x^2 = 4y$, point F is the focus of the probala, the point of intersection of the dirctrix and y-axis is M, N is a point ~~of~~ on the probala, $|NF| = \frac{\sqrt{3}}{2}|MN|$, $\angle NMF$ ____.

14. Compare " ~~2 angles~~ The sum and difference of the law of sine and cosin", for the 2 given functions

$$S(x) = \frac{e^x - e^{-x}}{2} \quad \text{and} \quad C(x) = \frac{e^x + e^{-x}}{2},$$

Write a correct computational equation ________.

15. ~~On~~ There are 2 points A, B on $y^2 = 4x$, point F is the focus of the probala, O is the origin, if $\vec{FO} + 2\vec{FA} + 3\vec{FB} = \vec{0}$, then the point of intersection of line AB and x-axis is ________.

16. F is the left focus of $\frac{x^2}{16} - \frac{y^2}{9} = 1$. On the right side of F of the x-axis, there is a point A, The points of intersection of the circle with radius FA and the 2 curves (above x-axis) are M, N, The value of $\frac{|FN| - |FM|}{|FA|}$ is ________.