KURDISTAN REGION GOVERNMENT -IRAQ **IN THE NAME OF ALLAH** **Time:3.30 hours**
MINISTRY OF EDUCATION
HIGH COMMITTEE OF THE GENERAL EXAMINATION
General Examinations for Preparatory Stage \ 2 nd Attempt
Study year (2023-2022) **(Grade twelve scientific)** **Subject : Mathematics**

Fingerprint

Choose the correct answer, two marks for each question.

1. Which of the following verifying the condition $f(-x) \neq -f(x)$?

A. $f(x)=\frac{3-x}{x}$ **B.** $f(x)=x^2+sinx$ **C.** $f(x)=cos2x$ **D.** All of them

2. Find the value of b when the equation passes through the points $(0\,,4)$ and $(2\,,0)$ and perpendicular to the line $x-by+1=0$. **A.** $\frac{-1}{2}$ **B.** $\frac{1}{2}$ **C.** -6 **D.** 2

3. Find the equation of the hyperbola. Vertices is: $(2\,,\pm3)$ and passes through the point $(0\,,\ 5)$

A. $\frac{y^2}{9}-\frac{4(x-2)^2}{9}=1$ **B.** $\frac{y^2}{9}+\frac{4(x-2)^2}{9}=1$

C. $\frac{y^2}{9}-\frac{9(x-2)^2}{4}=1$ **D.** $\frac{y^2}{9}+\frac{9(x-2)^2}{4}=1$

4. Determine the **D**omain and **R**ange of the function: $f(x)=\frac{3}{2x-6}$

A. **D**: $\{x/\,x\neq 3\}$ **R**: $\{y/\,y\neq 3\}$ **B.** **D**: $\{x\,/x\neq 3\}$ **R**: $\{y\,/\,y\neq 0\}$ **C.** **D**: $\{x/x\neq 3\}$ **R**: All real numbers **D.** **D**: $\{x/x\neq 3\}$ **R**: $\{y/y\neq 2\}$

5. Which of the following parabolas has the line $y=4$ as its directrix?

A. $y-5=\frac{1}{4}(x+2)^2$ **B.** $y+3=\frac{1}{4}(x-1)^2$

C. $x-5=\frac{1}{4}(y+4)^2$ **D.** $x+3=\frac{1}{4}(y-2)^2$

6. If you knowing that $f'(x)=2x-1$ and $f(-1)=5$, find the value of $\lim_{x\to 2}\frac{f(x)}{15}$.

A. $\frac{2}{15}$ **B.** $\frac{1}{15}$ **C.** $\frac{1}{3}$ **D.** $\frac{1}{5}$

7. Find the distance between the point $(-2\,,1\,)$ and the line $y=x-5$.

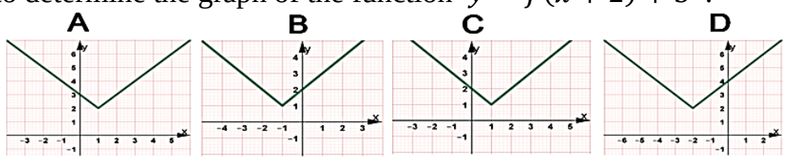
A. 4 **B.** $4\sqrt{2}$ **C.** $2\sqrt{2}$ **D.** $3\sqrt{2}$

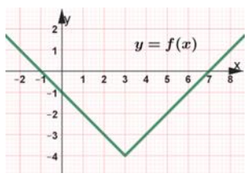
8. Find the value of : $\int_0^{\pi} cos^2x\ sinx\ dx$. **A.** $-\frac{1}{3}$ **B.** $\frac{1}{3}$ **C.** $\frac{2}{3}$ **D.** $-\frac{2}{3}$

9. Find the points of intersection of the two graph of the functions $y+x=5$ and $3x-4y=8$

A. $(3\,,\ 2)$ **B.** $(\ 1\,,\ 4\ )$ **C.** $(-2\ ,\ 7)$ **D.** $(\ 4\,,\ 1\ )$

10. Use the given graph of $y=f(x)$ on the right to determine the graph of the function $y=f(x+2)+5$.





11. Which of the following is true ? **A.** $\lim_{x\to 0}\frac{|x-1|-|x+1|}{x}=-2$ **B.** $\lim_{x\to 3.6}[x-1]=3$

C. $\lim_{x\to 2}\frac{2x^2-8}{2-x}=8$ **D.** $\lim_{\Delta x\to 0}\frac{cos(\pi+\Delta x)+1}{\Delta x}=1$

12. Find the value of $\lim_{x\to 0}\frac{x}{\sqrt{x+1}-1}$. **A.** -1 **B.** $\frac{1}{2}$ **C.** 0 **D.** 2

13. If $f(x)=\frac{-2}{(x-1)^2}$ find the value of $\lim_{x\to 1^-} f(x)$. **A.** $-\infty$ **B.** $+\infty$ **C.** -1 **D.** 0

14. If $f(x)=3-x$ and $g(x)=\sqrt{2x^2-x+3}$ find the value of $\lim_{x\to 1} g(f(x))$

A. 1 **B.** 2 **C.** 3 **D.** 4

15. If the function $f(x)=\frac{ax+3}{b-2x}$, has a horizontal asymptote : $y=-2$ and a vertical asymptote : $x=\frac{5}{2}$, find the result of : $3f(a)+5f'(b)$

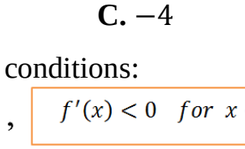
A. $\frac{-69}{5}$ **B.** $\frac{69}{5}$ **C.** $\frac{-121}{5}$ **D.** $\frac{121}{5}$

16. Which of the following function discontinuous at $x=1$ and the discontinuity is removable?

A. $f(x)=\frac{x^2+3x-4}{x^2-2x-1}$ **B.** $f(x)=\begin{cases}-2x+2 & x<1\\ x & x\geq 1\end{cases}$ **C.** $f(x)=\frac{5}{|x-1|}$ **D.** $f(x)=\frac{x^3-1}{x-1}$

17. Use the given graph to find the value of $\lim_{x\to 2} f(x)$

A. 0 **B.** 4
C. 2 **D.** *does not exist*



18. Find the vertical asymptotes of the function $f(x)=\frac{1}{tan\,x}$

A. $x=n\pi$ **B.** $x=\pi(n+\frac{1}{2})$ **C.** $x=2(n+\pi)$ **D.** $x=\pi(n-\frac{1}{2})$, $n\epsilon I$

19. Depending on the intermediate value theorem (IVT), which function achieve this condition (the equation $f(x)=0$) has a root between $-1\ and\ 1$?

A. $f(x)=\frac{x}{x^2+1}$ **B.** $f(x)=x^3-5$ **C.** $f(x)=\frac{1}{x}$ **D.** $f(x)=\sqrt{3-2x}$

20. If $f(x)=\frac{\cos 2x}{x^2}$ then find the value of $f'(\pi)$.

A. $\frac{2}{\pi^2}$ **B.** 0 **C.** $\frac{2}{\pi^3}$ **D.** $-\frac{2}{\pi^3}$

$g(1)=1$. **A.** -1 **B.** 0 **C.** 1 **D.** 6

22. Find the derivative of the function $f(x)=x\sqrt{x}$.

A. $f'(x)=\frac{1}{3\sqrt{x}}$ **B.** $f'(x)=2\sqrt{x}$ **C.** $f'(x)=\frac{3\sqrt{x}}{2}$ **D.** $f'(x)=\sqrt{x}+\frac{1}{2\sqrt{x}}$

23. Find the value of $(fog)'(2)$, given that $g(2)=-5$, $f'(-5)=-1$ and $g'(2)=4$

A. -20 **B.** 5 **C.** -4 **D.** 20

24. Which of the following function satisfying the given conditions:

$f(0)=4$, $f'(0)=0$, $f'(x)>0\ \ for\ x>0$, $f'(x)<0\ \ for\ x<0$

A. $f(x)=x^2+4$ **B.** $f(x)=x^3+4$ **C.** $f(x)=4-x^3$ **D.** $f(x)=-x^2+4$

25. Find the slope of the tangent line to the equation $x^3y+x=-1$ at the point $(1,-2)$

A. 5 **B.** -5 **C.** 6 **D.** -6

26. If $f(x)=\frac{-2}{x}$. Which of the following equals to $f'(-2)$?

A. $\lim_{\Delta x\to 0}\frac{\frac{-2}{-2+\Delta x}+1}{\Delta x}$ **B.** $\lim_{\Delta x\to 0}\frac{\frac{-2}{2+\Delta x}-1}{\Delta x}$ **C.** $\lim_{\Delta x\to 0}\frac{\frac{-2}{2+\Delta x}+1}{\Delta x}$ **D.** $\lim_{\Delta x\to 0}\frac{\frac{-2}{-2+\Delta x}-1}{\Delta x}$

27. An object moves according to the position function $S(t)=t^3-6t^2+9t$

Find its acceleration at $t=1$. **A.** 0 **B.** 4 **C.** -6 **D.** -9

28. Which of the following is the horizontal asymptote to the function $f(x)=\frac{1-|x|}{x+2}$?

A. $y=1$ **B.** $y=\frac{1}{2}$ **C.** $y=0$ **D.** $y=-\frac{1}{2}$

29. Use the graph of f on the right, at which value of x is $f''(x)<0$?

A. $]-\infty,-1[$ **B.** $]-\infty,0[$

C. $]0,+\infty[$ **D.** $]-1,1[$

30. Find the value of $\lim_{x\to+\infty}\frac{3x^3+5}{2x^2+1}$. **A.** $-\infty$ **B.** $+\infty$ **C.** 0 **D.** $\frac{3}{2}$

31. Find the equation of the tangent line to the function $f(x)=x^2e^x+1$ at $x=0$

A. $y=1$ **B.** $y=x+1$ **C.** $y=2x+1$ **D.** $y=-2x+1$

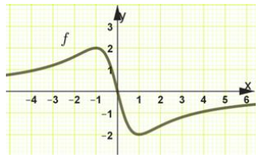
32. Find the x-intercept of the graph of the function: $f(x)=3+\frac{2}{x}$

A. $(\frac{-3}{2},0)$ **B.** $(\frac{-2}{3},0)$ **C.** $(\frac{1}{3},0)$ **D.** $(\frac{-1}{3},0)$

33. Find the point of inflection for the function $f(x)=2-(x-1)^2$

A.$(2,1)$ **B.**$(-1,-2)$ **C.**$(1,2)$ **D.** None

34. By using symmetry, asymptotes, intercepts, first and second derivative test determine the function of the given graph



A.$f(x)=\frac{4x}{x^2+1}$ **B.** $f(x)=\frac{-4x}{x^2+1}$

C.$f(x)=\frac{-4x}{2x^2+1}$ **D.** $f(x)=\frac{4x}{2x^2+1}$

35. If the function $f(x)=\begin{cases}x+1 & x\le 2\\ ax+7 & x>2\end{cases}$ have no points of discontinuity,

find the value of $\int_{2a}^{a}(3x^2+a)dx$. **A.** 9 **B.** 6 **C.** 18 **D.** 52

36. Find the mean value of the functions $f(x)=\sqrt{x}$ on the interval $[0,4]$.

A. $\frac{16}{3}$ **B.** $\frac{4}{3}$ **C.** $\frac{8}{3}$ **D.** $\frac{1}{2}$

37. Find $\int_0^{\frac{\pi}{3}}\frac{1}{cos^2x}\,dx$: **A.** $\sqrt{3}$ **B.** $\frac{1}{\sqrt{3}}$ **C.** $\frac{1}{2}$ **D.** $\frac{1}{\sqrt{2}}$

38. Find the second derivative of the function $f(x)=sin^2x$.

A. $f''(x)=sin2x$ **B.**$f''(x)=cos^2x-sin^2x$

C. $f''(x)=2cos2x$ **D.** $f''(x)=2sin2x$

39. Find $\int\frac{1}{(3x)^{-2}}\,dx$: **A.** $3x^3+c$ **B.** $\frac{1}{3x^3}+c$ **C.** $\frac{-1}{9x^3}+c$ **D.** $9x^3+c$

40. Find $\int lnx\;dx$: **A.** $f(x)=lnx+x+c$ **B.** $f(x)=lnx^2+c$

C. $f(x)=xlnx-x+c$ **D.** $f(x)=xlnx+x+c$

41. Find the area of the region bound by the graph of the function $f(x)=sinx$, the $x-axis$ and the two lines $x=0$ and $x=\pi$. **A.** 1 **B.** 2 **C.** 3 **D.** 4

42. Find the eccentricity of the ellipse : $4x^2+3y^2=12$

A. $\frac{1}{4}$ **B.** $\frac{\sqrt{3}}{2}$ **C.** $\frac{1}{2}$ **D.** $\frac{3}{4}$

43. Which of the following is the equation of the asymptote to the hyperbola: $x^2-\frac{y^2}{9}=1$?

A. $y=\frac{1}{3}x$ **B.** $y=1+3x$ **C.** $y=-3x$ **D.** $y=\frac{1}{9}x$

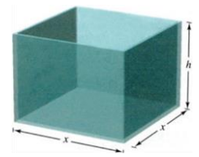
44. Find the slant asymptote of the graph of the function $f(x)=\frac{x^2+x-2}{x+3}$

A. $y=x$ **B.** $y=x+2$ **C.** $y=x+4$ **D.** $y=x-2$

45. Use integration to find the volume of the solid obtained by revolving the triangle with vertices: $(0,2)$ ، $(3,0)$ ، $(0,0)$ around the x-axis.

A. $\frac{4\pi}{3}$ **B.** 4π **C.** 12π **D.** 6π

46. An engineer in a certain factory wants to design an open box having a square base and a surface area of 675 cm^2,as shown in the figure. Choose the value of the height to produce a box of maximum volume?



A. $h=12.5cm$ **B.** $h=6.5cm$ **C.** $h=7.5\,cm$ **D.** $h=15cm$

47. If $y=e^{sinx}$, find $\frac{dy}{dx}$.

A. $\frac{dy}{dx}=y\,cosx$ **B.**$\frac{dy}{dx}=cosx\,e^{cosx}$ **C.** $\frac{dy}{dx}=sinx\,e^{cosx}$ **D.** $\frac{dy}{dx}=y\,e^{cosx}$

48. A (5 m) long ladder is leaning against a wall .The base of the ladder is pulled away from the wall at a rate of (3 m/s). How fast is the top of the ladder moving down the wall when the base is (4 m) from the wall?

A. -6 m/s **B.** $-\frac{3}{2}$ m/s **C.** -4 m/s **D.** $-\frac{7}{2}$ m/s

49. On which interval the given graph of the function f is decreasing? **A.** $]-2,2[$ **B.** $]-1,0[$

C. $]-1,+\infty[$ **D.** $]1,3[$

50. Find b so that the points $(0,-5)$، $(1,b)$ and $(2,-1)$ are collinear .

A. 0 **B.** 2 **C.** $\frac{1}{2}$ **D.** -3