Caluclus AB NAME: _____

MC Packet 1 - Pre-Calculus and Trig

PERIOD: _____

In-Class Together: Problems 1-6

(1) The graph of $y^2 = x^2 + 9$ is symmetric to which of the following?

I. The x-axis
II. The y-axis
III. The origin

(A) I only (B) II only (C) III only (D) I and II only (E) I. II, and III

(2) If the function f is defined by $f(x) = x^5 - 1$. then f^{-1}, the inverse function of f, is defined by $f^{-1}(x) =$

(A) $\frac{1}{\sqrt[5]{x}+1}$ (B) $\frac{1}{\sqrt[5]{x+1}}$ (C) $\sqrt[5]{x-1}$

(D) $\sqrt[5]{x}-1$ (E) $\sqrt[5]{x+1}$

(3) If $\log_a\left(2^a\right) = \frac{a}{4}$, then $a =$

(A) 2 (B) 4 (C) 8 (D) 16 (E) 32

④ Let $f(x)=\left|\sin x-\frac{1}{2}\right|$. The maximum value attained by f is

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{3}{2}$ (D) $\frac{\pi}{2}$ (E) $\frac{3\pi}{2}$

⑤ Let $f(x)=\cos(\arctan x)$. What is the range of f?

(A) $\left\{x\left|-\frac{\pi}{2}<x<\frac{\pi}{2}\right.\right\}$ (B) $\{x|0<x\le 1\}$ (C) $\{x|0\le x\le 1\}$

(D) $\{x|-1<x<1\}$ (E) $\{x|-1\le x\le 1\}$

⑥ If the graph of $y=\frac{ax+b}{x+c}$ has a horizontal asymptote $y=2$ and a vertical asymptote $x=-3$, then $a+c=$

(A) -5 (B) -1 (C) 0 (D) 1 (E) 5

(7) The set of all points (e^t, t), where t is a real number, is the graph of $y =$

(A) $\frac{1}{e^x}$ (B) $e^{\frac{1}{x}}$ (C) $xe^{\frac{1}{x}}$ (D) $\frac{1}{\ln x}$ (E) $\ln x$

(8) Suppose that f is a function that is defined for all real numbers. Which of the following conditions assures that f has an inverse function?

(A) The function f is periodic.
(B) The graph of f is symmetric with respect to the y-axis.
(C) The graph of f is concave up.
(D) The function f is a strictly increasing function.
(E) The function f is continuous.

(9) Which of the following equations has a graph that is symmetric with respect to the origin?

(A) $y = \frac{x+1}{x}$ (B) $y = -x^5 + 3x$ (C) $y = x^4 - 2x^2 + 6$

(D) $y = (x-1)^3 + 1$ (E) $y = \left(x^2+1\right)^2 - 1$

(10) If h is the function given by $h(x) = f(g(x))$, where $f(x) = 3x^2 - 1$ and $g(x) = |x|$, then $h(x) =$

(A) $3x^3 - |x|$ (B) $|3x^2 - 1|$ (C) $3x^2|x| - 1$ (D) $3|x| - 1$ (E) $3x^2 - 1$

(11) $4\cos\left(x+\frac{\pi}{3}\right)=$

(A) $2\sqrt{3}\cos x-2\sin x$ (B) $2\cos x-2\sqrt{3}\sin x$ (C) $2\cos x+2\sqrt{3}\sin x$

(D) $2\sqrt{3}\cos x+2\sin x$ (E) $4\cos x+2$

(12) If $f(x)=e^x$, which of the following lines is an asymptote to the graph of f?

(A) $y=0$ (B) $x=0$ (C) $y=x$ (D) $y=-x$ (E) $y=1$

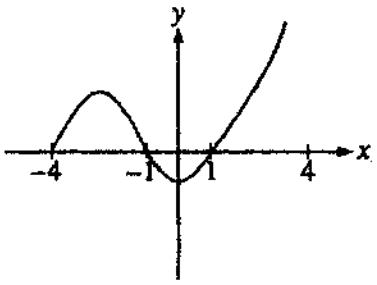
(13) $\ln(x-2)<0$ if and only if

(A) $x<3$ (B) $0<x<3$ (C) $2<x<3$

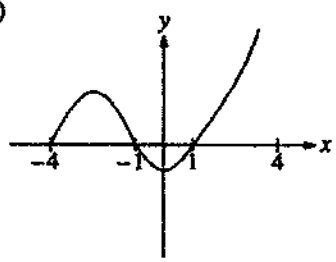
(D) $x>2$ (E) $x>3$

(14) The function defined by $f(x)=\sqrt{3}\cos x+3\sin x$ has an amplitude of

(A) $3-\sqrt{3}$ (B) $\sqrt{3}$ (C) $2\sqrt{3}$ (D) $3+\sqrt{3}$ (E) $3\sqrt{3}$



(15) The graph of $y = f(x)$ is shown in the figure above. Which of the following could be the graph of $y = f(|x|)$?

(A)


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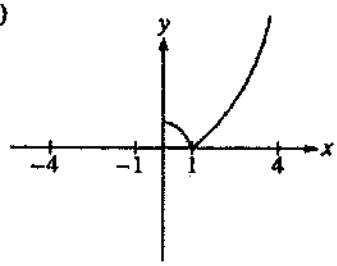
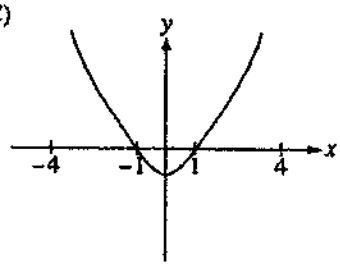


(C)


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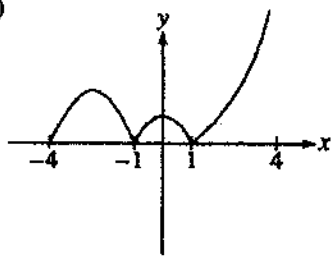
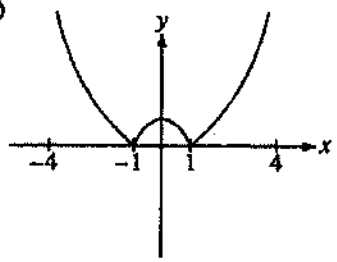


(E)


(16) If $f(g(x)) = \ln\left(x^2+4\right)$, $f(x) = \ln\left(x^2\right)$, and $g(x) > 0$ for all real x, then $g(x) =$

(A) $\dfrac{1}{\sqrt{x^2+4}}$ (B) $\dfrac{1}{x^2+4}$ (C) $\sqrt{x^2+4}$ (D) x^2+4 (E) $x+2$

(17) The domain of the function defined by $f(x) = \ln\left(x^2-4\right)$ is the set of all real numbers x such that

(A) $|x| < 2$ (B) $|x| \le 2$ (C) $|x| > 2$ (D) $|x| \ge 2$ (E) x is a real number

(18) If $f(x) = e^x \sin x$, then the number of zeros of f on the closed interval $[0, 2\pi]$ is

(A) 0 (B) 1 (C) 2 (D) 3 (E) 4

(19) If the domain of the function f given by $f(x)=\dfrac{1}{1-x^2}$ is $\{x:|x|>1\}$, what is the range of f?

(A) $\{x:-\infty<x<-1\}$ (B) $\{x:-\infty<x<0\}$ (C) $\{x:-\infty<x<1\}$

(D) $\{x:-1<x<\infty\}$ (E) $\{x:0<x<\infty\}$

(20) If $\ln x-\ln\left(\dfrac{1}{x}\right)=2$, then $x=$

(A) $\dfrac{1}{e^2}$ (B) $\dfrac{1}{e}$ (C) e (D) $2e$ (E) e^2

(21) The fundamental period of $2\cos(3x)$ is

(A) $\dfrac{2\pi}{3}$ (B) 2π (C) 6π (D) 2 (E) 3

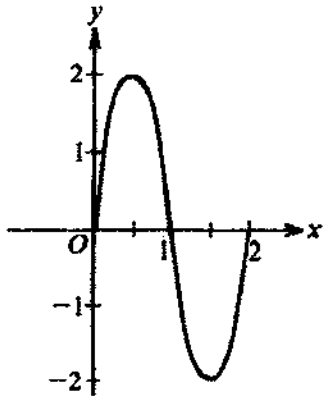
(22) If $f(x)=\dfrac{4}{x-1}$ and $g(x)=2x$, then the solution set of $f(g(x))=g(f(x))$ is

(A) $\left\{\dfrac{1}{3}\right\}$ (B) $\{2\}$ (C) $\{3\}$ (D) $\{-1,2\}$ (E) $\left\{\dfrac{1}{3},2\right\}$

(23) Which of the following defines a function f for which $f(-x)=-f(x)$?

(A) $f(x)=x^2$ (B) $f(x)=\sin x$ (C) $f(x)=\cos x$

(D) $f(x)=\log x$ (E) $f(x)=e^x$



(24) The figure above shows the graph of a sine function for one complete period. Which of the following is an equation for the graph?

(A) $y = 2\sin\left(\frac{\pi}{2}x\right)$ (B) $y = \sin(\pi x)$ (C) $y = 2\sin(2x)$

(D) $y = 2\sin(\pi x)$ (E) $y = \sin(2x)$

(25) What is the domain of the function f given by $f(x) = \frac{\sqrt{x^2 - 4}}{x - 3}$?

(A) $\{x: x \neq 3\}$ (B) $\{x: |x| \leq 2\}$ (C) $\{x: |x| \geq 2\}$

(D) $\{x: |x| \geq 2 \text{ and } x \neq 3\}$ (E) $\{x: x \leq 2 \text{ and } x \neq 3\}$

(26) If $f(x) = \frac{x}{x+1}$, then the inverse function, f^{-1}, is given by $f^{-1}(x) =$

(A) $\frac{x-1}{x}$ (B) $\frac{x+1}{x}$ (C) $\frac{x}{1-x}$ (D) $\frac{x}{x+1}$ (E) x

(27) The graph of which of the following equations has $y = 1$ as an asymptote?

(A) $y = \ln x$ (B) $y = \sin x$ (C) $y = \frac{x}{x+1}$ (D) $y = \frac{x^2}{x-1}$ (E) $y = e^{-x}$