17. An equation of the line tangent to the graph of $y=\cos(2x)$ at $x=\frac{\pi}{4}$ is

(A) $y-1=-\left(x-\frac{\pi}{4}\right)$ (B) $y-1=-2\left(x-\frac{\pi}{4}\right)$ (C) $y=2\left(x-\frac{\pi}{4}\right)$

(D) $y=-\left(x-\frac{\pi}{4}\right)$ (E) $y=-2\left(x-\frac{\pi}{4}\right)$

18. Let f be a function defined for all real numbers x. If $f'(x)=\frac{|4-x^2|}{x-2}$, then f is decreasing on the interval

(A) $(-\infty, 2)$ (B) $(-\infty, \infty)$ (C) $(-2, 4)$ (D) $(-2, \infty)$ (E) $(2, \infty)$

19. Let f be a differentiable function such that $f(3)=2$ and $f'(3)=5$. If the tangent line to the graph of f at $x=3$ is used to find an approximation to a zero of f, that approximation is

(A) 0.4 (B) 0.5 (C) 2.6 (D) 3.4 (E) 5.5

21. $\int_0^{\pi/3}\sin(3x)\,dx=$

(A) -2 (B) $-\frac{2}{3}$ (C) 0 (D) $\frac{2}{3}$ (E) 2

22. (Calc)

x	0	0.5	1.0	1.5	2.0
$f(x)$	3	3	5	8	13

A table of values for a continuous function f is shown above. If four equal subintervals of $[0, 2]$ are used, which of the following is the trapezoidal approximation of $\int_0^2 f(x)\,dx$?

(A) 8 (B) 12 (C) 16 (D) 24 (E) 32

23. $\int_1^2 \frac{1}{x^3}\,dx=$

(A) $-\frac{7}{8}$ (B) $-\frac{3}{4}$ (C) $\frac{15}{64}$ (D) $\frac{3}{8}$ (E) $\frac{15}{16}$

24. If $y=\dfrac{3}{4+x^2}$, then $\dfrac{dy}{dx}=$

(A) $\dfrac{-6x}{\left(4+x^2\right)^2}$ (B) $\dfrac{3x}{\left(4+x^2\right)^2}$ (C) $\dfrac{6x}{\left(4+x^2\right)^2}$ (D) $\dfrac{-3}{\left(4+x^2\right)^2}$ (E) $\dfrac{3}{2x}$

25. The function defined by $f(x)=x^3-3x^2$ for all real numbers x has a relative maximum at $x=?$

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

26. $\dfrac{d}{dx}\left(\dfrac{1}{x^3}-\dfrac{1}{x}+x^2\right)$ at $x=-1$ is

(A) -6 (B) -4 (C) 0 (D) 2 (E) 6

28. If $x^2+xy+y^3=0$, then, in terms of x and y, $\dfrac{dy}{dx}=$

(A) $-\dfrac{2x+y}{x+3y^2}$ (B) $-\dfrac{x+3y^2}{2x+y}$ (C) $-\dfrac{2x}{1+3y^2}$ (D) $-\dfrac{2x}{x+3y^2}$ (E) $-\dfrac{2x+y}{x+3y^2-1}$

29. $\displaystyle\int_1^2 \frac{x^2-1}{x+1}dx=$

(A) $\dfrac{1}{2}$ (B) 1 (C) 2 (D) $\dfrac{5}{2}$ (E) ln 3

30. If $\lim\limits_{x\to a} f(x)=L$, where L is a real number, which of the following must be true?

(A) $f'(a)$ exists (B) $f(x)$ is continuous at $x=a$. (C) $f(x)$ is defined at $x=a$.

(D) $f(a)=L$ (E) None of the above

31. $\dfrac{d}{dx}\displaystyle\int_2^x \sqrt{1+t^2}\,dt=$

(A) $\dfrac{x}{\sqrt{1+x^2}}$ (B) $\sqrt{1+x^2}-5$ (C) $\sqrt{1+x^2}$ (D) $\dfrac{x}{\sqrt{1+x^2}}-\dfrac{1}{\sqrt{5}}$ (E) $\dfrac{1}{2\sqrt{1+x^2}}-\dfrac{1}{2\sqrt{5}}$

32. The average value of $f(x)=x^2\sqrt{x^3+1}$ on the closed interval $[0, 2]$ is

(A) $\dfrac{26}{9}$ (B) $\dfrac{13}{3}$ (C) $\dfrac{26}{3}$ (D) 13 (E) 26