

1.(3) $\lim_{x \rightarrow 0} \sin xx^2 + 3x =$

- (A) 1 (B) 13 (C) 3 (D) ∞ (E) Does not exist

2.(14) If $f(x) = x^2 \sin 1x$, then $f'(x) =$

- (A) $2x \sin 1x - x^2 \cos 1x$ (B) $2x \cos 1x$ (C) $2x \cos 1x$
(D) $2x \sin 1x - \cos 1x$ (E) $-\cos 1x$

3.(15) If $y = \sqrt{x^2 + 16}$, then $d^2ydx^2 =$

- (A) $-1(x^2 + 16)^{32}$ (B) $4(x^2 + 16)$ (C) $16\sqrt{x^2 + 16}$
(D) $2x^2 + 16(x^2 + 16)^{32}$ (E) $16(x^2 + 16)^{32}$

4.(18) If $f(x) = 1 + x^2 1 - x^2$, then $f'(x) =$

- (A) $-4x(1 - x^2)^2$ (B) $4x(1 - x^2)^2$ (C) $-4x^2(1 - x^2)^2$
(D) $2x(1 - x^2)$ (E) $4(1 - x^2)$

5.(20) $ddx \sin^3(1 - 2x) =$

- (A) $6 \sin^2(1 - 2x) \cos(1 - 2x)$ (B) $-2 \cos^3(1 - 2x)$ (C) $-6 \sin^2(1 - 2x)$
(D) $-6 \sin^2(1 - 2x) \cos(1 - 2x)$ (E) $-6 \cos^2(1 - 2x)$

6.(22) The slope of the curve $y^3 - xy^2 = 4$ at the point where $y = 2$ is

- (A) -2 (B) 14 (C) 12 (D) -12 (E) 2

7.(32) If $\tan(xy) = x$, then $dydx =$

(A) $1 - \tan(xy) \sec(xy)x \tan(xy) \sec(xy)$ (B) $\sec^2(xy) - yx$ (C) $\cos^2(xy)$

(D) $\cos^2(xy)x$ (E) $\cos^2(xy) - yx$

8.(37) A funnel is in the shape of a cone with the height equal to the diameter (both 6 in). Liquid is being poured through at the rate of 2 cu. in per min. when it becomes completely clogged. How fast is the level of the liquid rising when the depth of the liquid is 2 in ($V = 13\pi r^2 h$).

(A) $1 < t < 3$ (B) $-2 < t < 3$ (C) $|t| > 3$

(D) $t < 1$ or $t > 3$ (E) all t

9.(42) If a particle's motion along a line is given by $s = f(t)$ and its velocity by $v = ks$, where k is a nonzero constant, then the particle's acceleration is

(A) $k^2\nu$ (B) k^2s (C) k (D) 0 (E) None of these

10.(45) A point moves a line such that its position is given by $x(t) = 8t - 3t^2$. What is the total distance traveled by the point between $t = 1$ and $t = 2$? (Note: determine the total distanced traveled by the particle, not the displacement)

(A) 1 (B) 43 (C) 53 (D) 2 (E) 5

11.(48) The minimum value of $f(x) = x^2 + 2x$ on the interval $[12, 2]$ is

(A) -12 (B) 1 (C) 3 (D) 92 (E) 5

12.(51) To the nearest hundredth, $\sqrt[3]{128}$ approximately equals
(Hint: $\sqrt[3]{125} = 5$)

(A) 5.28 (B) 5.02 (C) 5.04 (D) 5.07 (E) 5.10

13.(53) If $f(x)$ is a continuous function at the point c , which of the following statements may be false?

(A) $\lim_{x \rightarrow c} f(x)$ exist (B) $\lim_{x \rightarrow c} f(x) = f(c)$ (C) $f'(c)$ exist

(D) $f(c)$ is defined (E) $\lim_{x \rightarrow c^+} f(x) = \lim_{x \rightarrow c^-} f(x)$

14.(55) Let f and g be differentiable functions such that

$$f(1) = 2f'(1) = 3f'(2) = -4$$

- (A) -9 (B) -4 (C) 0 (D) 12 (E) 15