1. $\lim\limits_{x \to 0} \dfrac{\sin x(1 - \cos x)}{x^2} =$

    (a) 0 _____(correct)

    (b) 1

    (c) -1

    (d) ∞

    (e) $-\infty$

2. One statement is true about

$$g(x) = \frac{x^2 + x - 6}{|x - 2|}$$

    (a) $\lim\limits_{x \to 2} g(x)$ does not exist _____(correct)

    (b) $x = 2$ is a vertical asymptote

    (c) $\lim\limits_{x \to 2^+} g(x)$ does not exist

    (d) $\lim\limits_{x \to 2^-} g(x) = \lim\limits_{x \to 2^+} g(x)$

    (e) $\lim\limits_{x \to 2^-} g(x) = -\infty$

3. If the constant a will make the function $f(x) = \begin{cases} ae^{x-1} + 3, & x < 1 \\ \tan^{-1}(x-1) + 2, & x \geq 1 \end{cases}$

continuous over $(-\infty, \infty)$, then the value of $a^2 + a$ equal

  (a) 0 ————————————————————————————(correct)

  (b) 1

  (c) −1

  (d) $\dfrac{1}{e^2}$

  (e) $\dfrac{-1}{e^2}$

4. The domain of $f(x) = \dfrac{1}{[x] - x}$, where $[\ ]$ denotes the greatest integer function is

  (a) All real numbers except the integers ————————————————(correct)

  (b) All real numbers except the positive integers

  (c) All non-negative rational numbers

  (d) Set of Natural numbers only

  (e) All real numbers except zero

5. $\lim\limits_{x \to \frac{\pi}{6}} \dfrac{\dfrac{1 + \csc x}{1 - \csc x} + 3}{x - \dfrac{\pi}{6}} =$

(a) $-4\sqrt{3}$ _____(correct)

(b) $2\sqrt{3}$

(c) $-2\sqrt{3}$

(d) $\pi\sqrt{3}$

(e) $-\pi\sqrt{3}$

6. If $f(x) = \begin{cases} \cos x, & x < 0 \\ ax + b, & x \geq 0 \end{cases}$ is differentiable everywhere, then $b - a =$

(a) 1 _____(correct)

(b) 0

(c) -1

(d) 2

(e) -2

7. One statement is True about $f(x) = |\sin x|$ and $g(x) = \sin |x|$

   (a) The domain of $g'(x)$ is $(-\infty, \infty) - \{0\}$ _____(correct)
   (b) The range of $g(x)$ is $[0, 1]$
   (c) The domain of $f(x)$ is $[0, \infty)$
   (d) The domain of f' is all $x \neq n\pi$ where n is positive integer
   (e) The range of $f(x)$ is $(0, 1]$

8. $\lim\limits_{x \to 4} \left(4 - \dfrac{x}{2}\right) = 2$ then the value of δ such that
   $|f(x) - L| < \epsilon$ whenever $0 < |x - 4| < \delta$ is

   (a) 2ϵ _____(correct)
   (b) 4ϵ
   (c) $\dfrac{\epsilon}{2}$
   (d) $\dfrac{\epsilon}{4}$
   (e) ϵ

9. $\displaystyle \lim_{x \to 0} \frac{\cos x - 4\sin 3x - 1}{2x} =$

    (a) -6 ————————————————————————————(correct)

    (b) 0

    (c) 6

    (d) -4

    (e) 4

10. $\displaystyle \lim_{x \to \ln 3} \frac{e^{3x} - 27}{e^{2x} - 9} =$

    (a) $\dfrac{9}{2}$ ————————————————————————————(correct)

    (b) 0

    (c) 1

    (d) 9

    (e) $\ln 3$

11. Let $f(x) = \sqrt{2x} - 4$, then $\displaystyle\lim_{h \to 0} \frac{f(x+h) - f(x)}{h} =$

    (a) $\dfrac{1}{\sqrt{2x}}$ (correct)

    (b) $\dfrac{1}{2\sqrt{x}}$

    (c) $\dfrac{2}{\sqrt{x}}$

    (d) $\dfrac{1}{\sqrt{x}}$

    (e) $2\sqrt{x}$

12. The vertical asymptotes of the graph

$$f(x) = \frac{\ln(x^2 - 4)}{(x-1)(x+4)}$$

    are

    (a) $x = \pm 2,\ x = -4$ (correct)

    (b) $x = \pm 2,\ x = 1$

    (c) $x = 1,\ x = -4$

    (d) $x = 1$

    (e) $x = \pm 2,\ x = -4,\ x = 1$

13. $\lim\limits_{x \to \frac{1}{2}^-} (x^2 \sec \pi x) =$

    (a) ∞ ————————————————————————(correct)

    (b) $-\infty$

    (c) 0

    (d) $\dfrac{1}{4}$

    (e) $\dfrac{1}{2}$

14. Let $f(x) = \dfrac{x \sin 2x}{\sin^2 x}$, which of the following is false?

    (a) The graph of f has vertical asymptote of $x = 0$ ————————(correct)

    (b) The graph of f has vertical asymptote of $x = \pi$

    (c) The graph of f has vertical asymptote of $x = 2\pi$

    (d) f is discontinuous at $x = 0$

    (e) $\lim\limits_{x \to 0} f(x) = 2$

15. If the line $y = -4x + 1$ is tangent to the graph of the function $f(x) = k - x^2$, then $k =$

   (a) $k = -3$ _____(correct)
   (b) $k = -4$
   (c) $k = 4$
   (d) $k = 3$
   (e) $k = 2$

16. Let $p(x) = \dfrac{g(x) + 1}{f(x)}$, $g(2) = -1$, $g'(2) = 2$, $f(2) = 3$, then $p'(2) =$

   (a) $\dfrac{2}{3}$ _____(correct)
   (b) 0
   (c) $\dfrac{1}{3}$
   (d) $\dfrac{4}{9}$
   (e) $\dfrac{5}{9}$

17. Let $f(x) = \frac{1}{2}x\sin(2x)$, then $f'\left(\frac{\pi}{4}\right) =$

   (a) $\frac{1}{2}$ (correct)

   (b) $\frac{1}{2} + \frac{\pi}{4}$

   (c) $\frac{\pi}{4}$

   (d) $\frac{\pi}{4} + \frac{1}{4}$

   (e) $\frac{1}{2} - \frac{\pi}{4}$

18. $f(x) = \dfrac{\cos x}{1 - \sin x}$, then $f'(x) =$

   (a) $\dfrac{1}{1 - \sin x}$ (correct)

   (b) $\dfrac{\sin x}{(1 - \sin x)^2}$

   (c) $\dfrac{-\sin x}{1 - \sin x}$

   (d) $\dfrac{1}{(1 - \sin x)^2}$

   (e) 0

Answer Counts

V	A	B	C	D	E
1	5	5	2	3	3
2	5	3	2	5	3
3	2	1	7	4	4
4	1	5	2	4	6

Q	MASTER	CODE01	CODE02	CODE03	CODE04
1	A	B $_2$	D $_4$	C $_5$	D $_{18}$
2	A	E $_1$	A $_{18}$	C $_4$	D $_{10}$
3	A	C $_9$	A $_6$	C $_{11}$	E $_{12}$
4	A	E $_{12}$	C $_{17}$	E $_{10}$	B $_{13}$
5	A	B $_4$	D $_8$	B $_{12}$	D $_{17}$
6	A	A $_{17}$	E $_{15}$	C $_{13}$	C $_{16}$
7	A	D $_{15}$	D $_{13}$	C $_3$	E $_4$
8	A	E $_6$	A $_{12}$	C $_{15}$	E $_2$
9	A	A $_7$	D $_9$	D $_{18}$	B $_9$
10	A	B $_8$	D $_{14}$	A $_{16}$	E $_5$
11	A	A $_{10}$	E $_3$	D $_2$	E $_7$
12	A	D $_{14}$	A $_{10}$	A $_{17}$	A $_1$
13	A	B $_5$	C $_{16}$	D $_7$	D $_{11}$
14	A	C $_{18}$	A $_1$	E $_6$	B $_8$
15	A	D $_{16}$	E $_5$	E $_1$	E $_{14}$
16	A	A $_3$	B $_2$	D $_9$	C $_6$
17	A	B $_{11}$	B $_7$	C $_8$	B $_3$
18	A	A $_{13}$	B $_{11}$	E $_{14}$	B $_{15}$