1. The limit $\lim_{x\to 0} \frac{|x|}{x}$

   (a) does not exist

   (b) equals 1

   (c) equals 0

   (d) tends to $+\infty$

   (e) tends to $-\infty$

2. If $f(x) = \sqrt{x}\, g(x)$ where $g(4) = 2$ and $g'(4) = 3$, then $f'(4)$ is equal to

   (a) $\frac{13}{2}$

   (b) $\frac{9}{2}$

   (c) 10

   (d) $\frac{16}{5}$

   (e) 4

3. For $y = \dfrac{2x-5}{(x^2+4)^3}$, $y'|_{x=0} =$

(a) $\dfrac{1}{32}$

(b) $\dfrac{1}{64}$

(c) $\dfrac{1}{16}$

(d) $\dfrac{1}{8}$

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

4. The derivative of $f(x) = \sqrt{\ln x}$ when $x = e$ is

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

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

(c) 0

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

(e) -1

5. If $\sin(x+y) = y^2 \cos x$, then the value of y' at $x = 0 = y$ is

(a) -1

(b) 0

(c) -2

(d) $\frac{1}{2}$

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

6. The derivative of $y = x^{\sqrt{x}}$ at $x = 1$ is

(a) 1

(b) 0

(c) $\frac{1}{2}$

(d) $\frac{3}{2}$

(e) -1

7. If $f(x) = \frac{1}{x}$, then $f^{(5)}(2) =$

(a) $-\frac{15}{8}$

(b) $\frac{15}{8}$

(c) 7680

(d) -7680

(e) 0

8. The absolute minimum value of $f(x) = 6x^{4/3} - 3x^{1/3}$ on the interval $[-1, 1]$ is

(a) $-\frac{9}{8}$

(b) $-\frac{9}{7}$

(c) 1

(d) 0

(e) -1

9. The function $f(x) = \frac{x^3}{3} - x^2 - 3x + 4$ has

(a) a relative maximum value $\frac{17}{3}$ and a relative minimum value -5

(b) a relative maximum value 1 and a relative minimum value 0

(c) a relative maximum value 0 and a relative minimum value -1

(d) a relative minimum value 2 and a relative maximum value 6

(e) a relative minimum value -1 and a relative maximum value 2

10. The function $f(x) = e^x - 1$ has

(a) one horizontal asymptote $y = -1$

(b) two horizontal asymptotes $y = -1, 0$

(c) one vertical asymptote at $x = 0$

(d) two vertical asymptotes at $x = 0, 1$

(e) one oblique asymptote $y = \frac{x}{2} + 1$

11. The cost per unit of producing a product is 5 dollars and the demand equation is $p = \frac{20}{\sqrt{q}}$. The price that will give maximum profit is

(a) 10$

(b) 9$

(c) 7$

(d) 13$

(e) 11$

12. For the function $f(x) = 3x^2 - 5$, x changes from 2 to 2.1. Using differentials, approximate value of $f(2.1)$ is

(a) 8.2

(b) 7.4

(c) 6.3

(d) 5.8

(e) 5.3

13. $\int \frac{6x}{(x^2+1)\ln(x^2+1)}\,dx =$

(a) $3\ln|\ln(x^2+1)|+C$

(b) $\frac{1}{2}\ln(2+x^2)+C$

(c) $\frac{1}{2}(x^2+1)^2+C$

(d) $-\frac{1}{2}(x^2+1)^2+C$

(e) $\frac{2}{5}(x^2+1)^2-x+C$

14. If $\frac{dy}{dx}=6-5\sin 2x$ and $y(0)=3$, then $y|_{x=\frac{\pi}{4}} =$

(a) $\frac{3\pi}{2}+\frac{1}{2}$

(b) $\frac{\pi}{2}$

(c) $-\frac{\pi}{2}$

(d) $\frac{3\pi}{4}-\frac{1}{2}$

(e) 3π

15. An equation of the plane that is parallel to the yz-plane and passes through $(4, 6, 9)$ is

(a) $x = 4$

(b) $y = 6$

(c) $z = 4$

(d) $x = 6$

(e) $z = 9$

16. If $f(x, y, z) = (2x + y^2 + z)^3$, then $\dfrac{\partial^3 f}{\partial z\, \partial y\, \partial x} =$

(a) $24y$

(b) $3 + 2y$

(c) $2x + y^2 + z$

(d) 0

(e) $6(2x + y^2 + z)$

17. If $f(x) = (3 + \csc x)^3 \cos x$, then $f'\left(\frac{\pi}{2}\right) =$

(a) -64

(b) 32

(c) 64

(d) -32

(e) 0

18. The function $f(x, y) = \frac{x^3}{3} + \frac{y^2}{2} + xy - 6x + 3$ has a relative minimum at

(a) $(3, -3)$

(b) $(2, -2)$

(c) $(2, 2)$

(d) $(-3, 3)$

(e) $(-2, 2)$

19. $\int_{-1}^{0} xe^{-x}\, dx =$

(a) -1

(b) $-1-e$

(c) $1-e$

(d) 1

(e) $1+e$

20. The exact area of the region bounded by the graphs of $y = x^2 - 5$ and $y = 2x + 3$ is

(a) 36

(b) 60

(c) $\frac{73}{3}$

(d) $\frac{28}{3}$

(e) 24

21. The area of the region bounded by $y = x^2 - 4$ and the x-axis from $x = 0$ to $x = 4$ is

(a) 16

(b) $\frac{32}{3}$

(c) 12

(d) $\frac{64}{3}$

(e) $\frac{16}{3}$

22. $\int_0^1 x\sqrt{x^2+1}\,dx =$

(a) $\frac{2\sqrt{2}-1}{3}$

(b) $\frac{2\sqrt{2}+1}{3}$

(c) 1

(d) $\frac{2(2\sqrt{2}+1)}{3}$

(e) $\frac{2(2\sqrt{2}-1)}{3}$

23. $\int_{-2}^{0} \frac{1}{\sqrt{1-4x}}\, dx =$

(a) 1

(b) 2

(c) 3

(d) 4

(e) 5

24. If $\int_{e^2}^{e^4} \frac{k}{x}\, dx = 1$, then $k =$

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

(b) 4

(c) $\ln 2$

(d) 2

(e) $\frac{1}{4}$

25. A television manufacturing company makes two types of television. The cost of producing x units of type A and y units of type B is given by the function $C(x, y) = 120 + x^3 + 8y^3 - 24xy$. The minimum cost is

(a) 56

(b) 60

(c) 52

(d) 48

(e) 44

ANSWER KEY

Q	MM	V1	V2	V3	V4
1	a	c	a	d	c
2	a	a	b	c	d
3	a	d	c	a	c
4	a	b	d	e	d
5	a	b	d	a	a
6	a	c	c	e	e
7	a	a	a	c	b
8	a	d	a	c	c
9	a	e	a	a	a
10	a	c	a	a	c
11	a	d	a	c	c
12	a	a	d	b	a
13	a	b	b	b	c
14	a	e	d	b	d
15	a	c	b	d	b
16	a	b	a	e	b
17	a	e	b	b	c
18	a	b	d	e	b
19	a	b	b	a	d
20	a	b	b	c	e
21	a	c	a	d	c
22	a	c	a	d	d
23	a	d	b	b	a
24	a	c	a	c	c
25	a	e	c	c	a