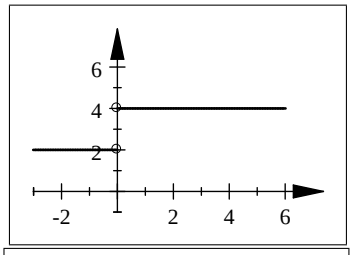
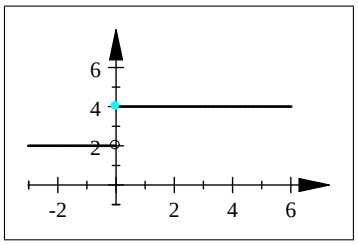
Form A . Instructions: (44 points). Solve each of the following problems and choose the correct answer :

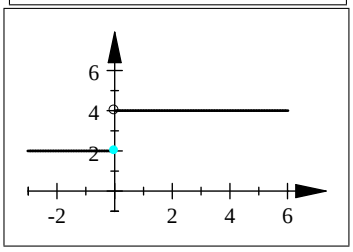
1. If $f\ (x) = \sqrt{x-1} + \sqrt{2-x}$, then $domain\ (f\ ) =$

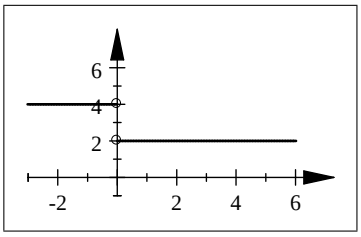
   (a) $[1, 2]$
   (b) $(1, 2)$
   (c) $(-\infty, 1) \cup (2, \infty)$
   (d) $(-\infty, 1] \cup [2, \infty)$

2. If $f\ (x) = \dfrac{3x + |x|}{x}$, then the graph of $f(x)$ is given by

(a) 

(b) 

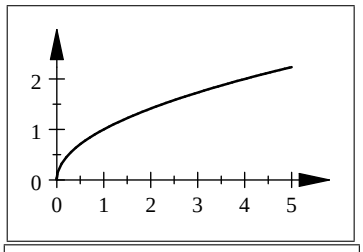
(c) 

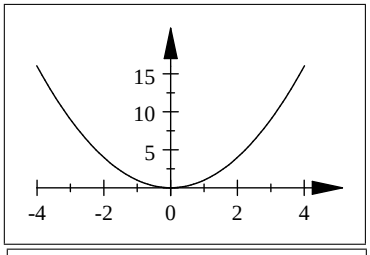
(d) 

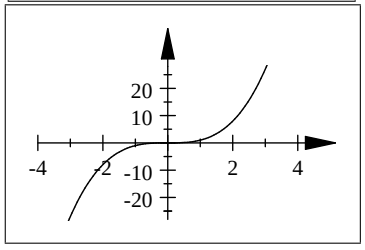
3. The degree of the polynomial $p(x) = 2x + 3$ is

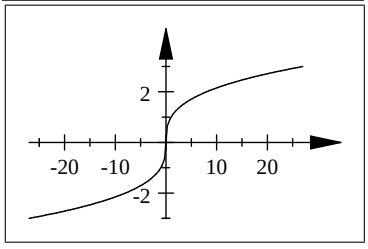
   (a) 0
   (b) 1
   (c) 2
   (d) 3

4. The graph of the function $y = x^2$ is

(a) 

(b) 

(c) 

(d) 

5. If $f(x) = \dfrac{x^2+1}{x^3-x}$, then $f(x)$ is

(a) even function
(b) odd function
(c) even and odd function
(d) neither even nor odd

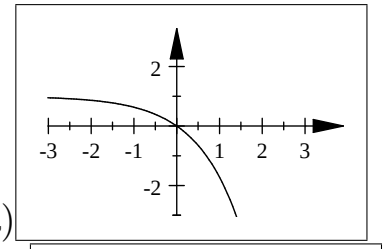
6. The graph of $f(x) = |x+2|$ is reflected about the x-axis .An equation of the new graph is

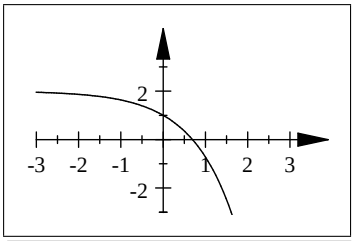
(a) $y = -|x+2|$
(b) $y = -|x-2|$
(c) $y = |-x+2|$
(d) $y = |-x-2|$

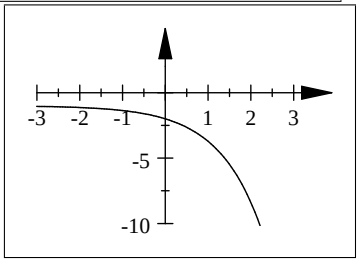
7. If $f(x) = \sqrt[6]{x}$, $g(x) = \sqrt[3]{x}$ and $h(x) = \dfrac{1}{\sqrt[6]{x}}$, then $h =$

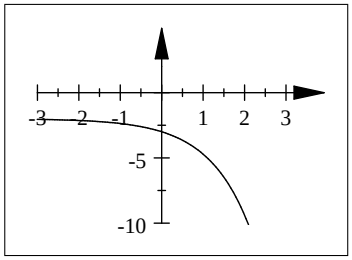
(a) $\dfrac{f}{g}$
(b) $f\ (g(x))$
(c) $\dfrac{g}{f}$
(d) $f\ g$

8. The graph of the function $f(x) = -e^x + 1$ is

(a) 

(c) 

(b) 

(d) 

9. If $f(x) = e^x$ and $g(x) = (\frac{1}{2})^x$, then $(\frac{f}{g})(1) =$

(a) $2e$

(b) $2 - e$

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

(d) $2 + e$

10. The range of the function $f(x) = e^x$ is

(a) $\mathbb{R}$

(b) $(0, \infty)$

(c) $(0, 1)$

(d) $[0, \infty)$

11. $\sin^{-1}(\cos(\tan^{-1} 0)) =$

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

(b) 0

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

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

12. If $f(x) = \begin{cases} x^3 & \text{if } x \leq 2 \\ 2 - x & \text{if } x > 2 \end{cases}$, then $\lim_{x \longrightarrow 2} f(x) =$

(a) 0

(b) 2

(c) 8

(d) Does not exist.

13. The function $f(x) = \dfrac{3 - x}{\ln(x - 1)}$ has a vertical asymptote at

(a) $x = 3$

(b) $x = 2$

(c) $x = 1$

(d) $x = -1$

14. $\lim_{x \longrightarrow -2} \dfrac{2-|x|}{2+x} =$

(a) 0

(b) 1

(c) -1

(d) Does not exist.

15. $\lim_{x \longrightarrow -1} \dfrac{x-2}{x^2+4x-3} =$

(a) $-\dfrac{1}{6}$

(b) $\dfrac{1}{6}$

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

(d) $-\dfrac{3}{2}$

16. If $\lim_{x \to 3} \dfrac{f(x)}{x} = 2$, then $\lim_{x \to 3} f(x) =$

(a) 6

(b) 3

(c) 2

(d) 0

17. $\lim_{x \to \infty} (2x^2 + 7x - 1)$

(a) 0

(b) 1

(c) $-\infty$

(d) ∞

18. The horizontal asymptote of $f(x) = \dfrac{-3x^2 - 2x + 2}{2x + x^2 + 1}$ is

(a) $y = 3$

(b) $y = -3$

(c) $y = -\dfrac{3}{2}$

(d) $x = -3$

19. The function $f(x) = \begin{cases} 1-x & \text{if } x \geq 1 \\ x^2-1 & \text{if } x < 1 \end{cases}$ is continuous at $x = 1$

(a) True

(b) False

20. If $f(x) = \dfrac{x+2}{x^2+2x-15}$, then $f(x)$ is continuous on

(a) $(-\infty, -5) \cup (-5, 3) \cup (3, \infty)$

(b) $(-\infty, -3) \cup (-3, 5) \cup (5, \infty)$

(c) $(-\infty, -5) \cup (-5, \infty)$

(d) $(-\infty, 5) \cup (5, \infty)$

21. If $f(-1) = 2$, $f'(-1) = 4$, then the equation of the tangent line of the curve $f(x)$ is

(a) $y = 2x + 6$

(b) $y = 2x - 9$

(c) $y = 4x + 6$

(d) $y = 4x - 9$

22. The slope of the tanget line to the curve $f(x) = \dfrac{x-1}{x+2}$ at the point (1,2) is $m =$

(a) $\dfrac{1}{3}$

(b) -3

(c) -1

(d) $\dfrac{1}{9}$

23. The derivative of the function $f(x)$ at $x = a$ is given by

(a) $\lim\limits_{h \to 0} \dfrac{f\ (a+h) - f\ (a)}{h}$

(b) $\lim\limits_{h \to 0} \dfrac{f\ (a-h) - f\ (a)}{h}$

(c) $\lim\limits_{h \to 0} \dfrac{f\ (a+h) + f\ (a)}{h}$

(d) $\lim\limits_{h \to 0} \dfrac{f\ (a-h) + f\ (a)}{h}$

24. The function $f(x) = |x+1|$ is differentiable on

(a) $\mathbb{R}$

(b) $(-\infty, 1) \cup (1, \infty)$

(c) $(-\infty, -1) \cup (-1, \infty)$

(d) $(-\infty, 1)$

25. If $f(x)$ is differentiable at $x = a$, then $f(x)$ is continuous at $x = a$.

(a) True

(b) False

26. If $y = x^3 - 4x^2 - 5$, then $\left.\dfrac{dy}{dx}\right|_{x=-1}$

(a) 11

(b) 6

(c) -5

(d) -10

27. If $f(x) = \sqrt{x}(1+x)$, then $f'(x)$

(a) $\dfrac{1}{2\sqrt{x}} + \dfrac{3}{2\sqrt{x}}$

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

(c) $\dfrac{1}{2}\sqrt{x} + \sqrt{x^3}$

(d) $\dfrac{1}{2\sqrt{x}} + x\sqrt{x}$

28. $\dfrac{d}{dx}(\pi - 2)^e =$

(a) 0

(b) e

(c) $e\ (\pi - 2)^{e-1}$

(d) $\pi(e-2)$

29. The 25^{th} derivative of $\cos x$ is

(a) $\sin x$

(b) $-\sin x$

(c) $\cos x$

(d) $-\cos x$

30. If $f(x) = \sin^2 x + \cos^2 x$, then $f'(x) =$

(a) 0

(b) 1

(c) $-4 \sin x \ \cos x$

(d) $4 \sin x \ \cos x$

31. $\lim\limits_{\theta \to 0} \dfrac{\sin \theta}{\theta + \tan \theta}$

(a) 0

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

(c) 2

(d) Does not exist.

32. $\lim\limits_{x \to 0} \dfrac{\sin 7x}{2x} =$

(a) 0

(b) 1

(c) $\dfrac{7}{2}$

(d) ∞

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

(a) $\dfrac{y^2 - 1}{3 - 2x}$

(b) $\dfrac{y^2 - 1}{3 - xy}$

(c) $\dfrac{y^2 - 1}{3y - 2xy}$

(d) $\dfrac{y^2 - 1}{3 - 2xy}$

34. $\dfrac{d}{dx}[\sin^{-1} x + \cos^{-1} x] = 0$

(a) True

(b) False

35. If $e^{x\,y} = 1$, then $y' =$

(a) $\dfrac{-y}{x}$

(b) $\dfrac{-x}{y}$

(c) $\dfrac{x}{y}$

(d) $\dfrac{y}{x}$

36. If $f(x) = \log_2(5 + \cot x)$, then $f'(x) =$

(a) $\dfrac{-\csc^2 x}{(5 + \cot x)\ \ln 2}$

(b) $\dfrac{-\csc^2 x\ \ln 2}{(5 + \cot x)}$

(c) $\dfrac{-\csc x\ \cot x}{(5 + \cot x)\ \ln 2}$

(d) $\dfrac{-\csc x\ \cot x\ \ln 2}{(5 + \cot x)}$

37. If $y = x^{\sin x}$ then $y' =$

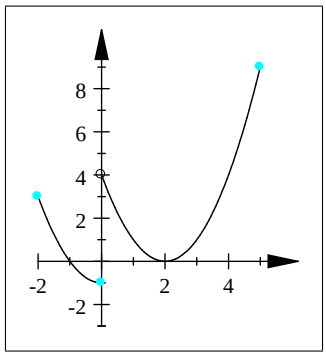
(a) $\dfrac{\sin x}{x} + \ln x\ \cos x$

(b) $\ln x\ x^{\sin x}\ \cos x$

(c) $x^{\sin x}\ (\dfrac{\sin x}{x} + \ln x\ \cos x)$

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

38. The function $g\ (x)$ whose graph is shown has



	absolute maximum	absolute minimum	local extremum
(a)	at $x = 4$	at $x = 0$	minimum at $x = 2$
(b)	at $x = 0$	no	minimum at $x = 2$
(c)	at $x = 4$	at $x = 0$	maximum at $x = -2$
(d)	at $x = 0$	at $x = 2$	maximum at $x = -2$.

39. The absolute extreme values of the function $f\ (x) = x^3 - 3x + 1$ on $[0, 3]$ are

	absolute maximum	absolute minimum
(a)	$f\ (3)$	$f\ (1)$
(b)	$f\ (1)$	$f\ (0)$
(c)	$f\ (3)$	$f\ (-1)$
(d)	$f\ (1)$	$f\ (3)$

40. The value of c that satisfying the conclusion of the Mean Value Theorem for the function $f(x) = 2x^2 + 7$ on the interval $[1, 5]$ is

(a) 3

(b) $\frac{1}{3}$

(c) -3

(d) $-\frac{1}{3}$

41. The function $f\ (x) = x^3 - 12x + 1$ is

(a) increasing in $(-2, 2)$ and decreasing in $(-\infty, -2)$

(b) increasing in $(2, \infty)$ and decreasing in $(-\infty, 2)$

(c) increasing in $(-\infty, -2)$ and $(2, \infty)$ and decreasing in $(-2, 2)$

(d) increasing in $(-2, 2)$ and decreasing in $(-\infty, -2)$ and $(2, \infty)$

42. The graph of the function $f(x) = 27x - x^3$ is concave up on :

(a) $(0, \infty)$

(b) $(-\infty, 0)$

(c) $(-\infty, 3)$

(d) $\mathbb{R}$

43. $\lim\limits_{x \to 0} \dfrac{x}{\ln(1+x)} =$

(a) 0

(b) 1

(c) $-\infty$

(d) ∞

44. $\lim\limits_{x \to 0} \dfrac{e^{4x} - 1 - 4x}{x^2} =$

(a) 8

(b) 4

(c) 0

(d) Does not exist .