

# Concept in Calculus Summer Package

This package is for those students who will be in the Concept in Calculus class.

1. Factor  $x^2 - 12x + 32$                       Ans :  $(x - 4)(x - 8)$
2. Factor  $2x^2 - 3x - 20$                       Ans :  $(2x + 5)(x - 4)$
3. Factor  $-3x^3 - 9x^2 + 120x$                       Ans :  $-3x(x - 5)(x + 8)$
4. Factor  $4x^4 - 4x^3 - 35x^2$                       Ans :  $x^2(2x + 5)(2x - 7)$
5. Factor  $9x^4 + 39x^2 + 36$                       Ans :  $3(3x^2 + 4)(x^2 + 3)$
6. Factor  $4x^6 + 10x^3 - 84$                       Ans :  $2(2x^3 - 7)(x^3 + 6)$
7. Factor  $9x^2 - 48xy + 64^2$                       Ans : not factor
8. Factor  $x^3 + 64$                       Ans :  $(x + 4)(x^2 - 4x + 16)$
9. Factor  $x^4 - 64$                       Ans :  $(x - 4)(x^2 + 4x + 16)$
10. Factor  $x^3 + 5x^2 - 9x - 45$                       Ans :  $(x - 3)(x + 3)(x + 5)$
11. Factor  $x^4 - 4x^3 + 9x^2 - 36x$                       Ans :  $x(x - 4)(x^2 + 9)$
12. Simplify  $\frac{x^2 - 36}{x^2 - 12x + 36}$                       Ans :  $\frac{(x + 6)}{(x - 6)}$
13. Simplify  $\frac{x^2 - 4x - 12}{x^2 - 12x + 36}$                       Ans :  $\frac{(x + 2)}{(x - 6)}$
14.  $\frac{2}{3x} - \frac{x - 1}{6}$                       Ans :  $\frac{-x^2 + x + 4}{6x}$
15.  $\frac{2}{3x} - \frac{x - 1}{6x^2}$                       Ans :  $\frac{3x + 1}{6x^2}$
16.  $\frac{1}{x + 7} - \frac{4}{x - 7}$                       Ans :  $\frac{-3x - 35}{x^2 - 49}$

$$17. \frac{x+2}{x^2-6x+5} - \frac{(x-2)}{x-5} \quad \text{Ans: } \frac{-x^2+4x}{x^2-6x+5}$$

$$18. \text{ Solve the equation } 3y = ky + hx + t \text{ for } x? \quad \text{Ans: } \frac{3y - ky - t}{h}$$

$$19. \text{ Solve the equation } 3y = ht + xt + d \text{ for } t? \quad \text{Ans: } \frac{3y - t}{h + x}$$

$$20. \text{ Solve the equation } 2y + 1 = \frac{4 + 7x}{t} \text{ for } t? \quad \text{Ans: } \frac{4 + 7x}{2y + 1}$$

$$21. \text{ Solve the equation } S = \frac{3r + t}{r - 2}, \text{ for } r \quad \text{Ans: } \frac{2S + t}{S - 2}$$

$$22. \text{ Solve the equation } S = \frac{3rt + t}{r - t}, \text{ for } t \quad \text{Ans: } \frac{Sr}{3r + S + 1}$$

$$23. \text{ Given } f(x) = \sqrt{x-2}; g(x) = x^2 - 1; h(x) = \frac{1}{x}$$

$$a. \text{ What is the domain of } f(x)? \quad \text{Ans; } x \geq 2 \text{ or } [2, \infty)$$

$$b. \text{ What is the domain of } g(x)? \quad \text{Ans; Any } x$$

$$c. \text{ What is } f(x) + g(x)? \text{ What is the domain?}$$

$$\text{Ans; } \sqrt{x-2} + x^2 - 1; x \geq 2 \text{ or } [2, \infty)$$

$$d. \text{ What is } f(x) * g(x)? \text{ What is the domain?}$$

$$\text{Ans; } (x^2 - 1)\sqrt{x-2}; x \geq 2 \text{ or } [2, \infty)$$

$$e. \text{ What is } \frac{f(x)}{g(x)}? \quad \text{What is the domain?}$$

$$\text{Ans; } \frac{\sqrt{x-2}}{(x^2-1)}; x \geq 2 \text{ or } [2, \infty)$$

$$f. \text{ What is } \frac{g(x)}{f(x)}? \quad \text{What is the domain?}$$

$$\text{Ans; } \frac{(x^2-1)}{\sqrt{x-2}}; x > 2 \text{ or } (2, \infty)$$

$$g. \text{ What is } f(g(x))? \quad \text{What is the domain?}$$

$$\text{Ans; } \sqrt{x^2-3}; x \geq \sqrt{3} \text{ or } x \leq \sqrt{3} \text{ } (-\infty, -\sqrt{3}] \text{ or } [\sqrt{3}, \infty)$$

24. Given the piecewise function  $f(x) = \begin{cases} x+4 & x > 1 \\ x^2 + 1 & x \leq 1 \end{cases}$ , what is the following :

a.  $f(2) =$                       Ans :  $2+4$  or  $6$

b.  $f(1) =$                       Ans :  $(1)^2 + 1$  or  $2$

c.  $f(0) =$                       Ans :  $(0)^2 + 1$  or  $1$

25. What is the inverse function of  $f(x) = 3x - 7$ ?      Ans :  $\frac{x+7}{3}$

What is the domain of  $f^{-1}(x)$ ?                      Ans : Any  $x$

26. What is the inverse function of  $f(x) = \sqrt{x} - 7$ ?      Ans :  $(x-7)^2$

What is the domain of  $f^{-1}(x)$ ?                      Ans :  $[-7, \infty)$

27. What is the inverse function of  $f(x) = \sqrt{x-7}$ ?      Ans :  $(x)^2 + 7$

What is the domain of  $f^{-1}(x)$ ?                      Ans :  $[0, \infty)$

28. Is  $g(x) = \sqrt{x+3}$  the inverse function of  $f(x) = x^2 - 3$ ?      Ans : yes

29. Expand the expression  $\log_2 \left( \frac{x^2}{5} \right)$ .      Ans :  $2 \log_2 x - \log_2 5$

30. Expand the expression  $\log_2 2x^3$ .      Ans :  $1 + 3 \log_2 x$

31. Expand the expression  $\log_2 (2x)^4$ .      Ans :  $4 + 4 \log_2 x$

32. Expand the expression  $\log \left( \frac{x}{2y} \right)$ .      Ans :  $\log x - \log y - \log 2$

33. Condense the expression  $\log (4) - 2 \log (x)$ .      Ans :  $\log \left( \frac{4}{x^2} \right)$

34. Condense the expression  $\log (x-2) - 3$ .      Ans :  $\log \left( \frac{x-2}{1000} \right)$

35. What is  $\lim_{x \rightarrow 3} \frac{3}{x-5}$       Ans :  $-\frac{3}{2}$

36. What is  $\lim_{x \rightarrow 5^+} \frac{3}{x-5}$       Ans :  $+\infty$

37. What is  $\lim_{x \rightarrow 5^-} \frac{3}{x-5}$       Ans :  $-\infty$

38.  $f(x) = 2x + 3$ , what is  $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$       Ans :  $2$

39.  $f(x) = x^2 + 3$ , what is  $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$       Ans :  $2x$

40. What is the partial fraction of  $\frac{x}{(x-2)(x-3)}$  :      Ans :  $\frac{3}{(x-3)} - \frac{2}{(x-2)}$

41. What is the partial fraction of  $\frac{3x+50}{(x-9)(x+2)}$  :      Ans :  $\frac{7}{(x-9)} - \frac{4}{(x+2)}$