

**SCIENTIFIC CALCULATOR ONLY--- NO graphing calculator allowed on the final!!!**

1) Find the vertical asymptote(s) of:  $f(x) = \frac{1}{x^2 - 3x - 10}$

- [A]  $y = 2, -5, -3$     [B]  $x = 2, -5, -3, 1$     [C]  $x = 1$     [D]  $x = 5, -2$     [E] None of these

2) Find the horizontal asymptote(s) of:  $f(x) = \frac{x^2 - 1}{x^2 - 9}$

- [A]  $y = 1$     [B]  $y = 0$     [C]  $x = 1$     [D]  $x = 1, -1$     [E] None of these

3) Find the domain of:  $f(x) = \frac{x^3 - 1}{x^2 - 4}$

- [A] All real    [B]  $\mathbb{R}, x \neq 2$     [C]  $\mathbb{R}, x \neq 1$     [D]  $\mathbb{R}, x \neq 1, 2$     [E] None of these

4) Find all x- and y-intercepts of:  $f(x) = \frac{x - 14}{x^2 - 4}$

- [A]  $x = 14$   
 $y = -2$     [B]  $x = -12, \frac{1}{2}$   
no y - intercept    [C]  $x = 14$   
 $y = \frac{1}{2}$     [D]  $x = 14$   
 $y = -\frac{7}{2}$     [E] None of these

5) Find the slant asymptote of:  $f(x) = \frac{x^3 + 7x^2 - 1}{x^2 + 1}$

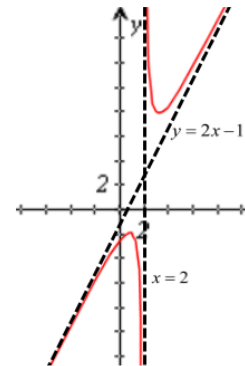
- [A]  $y = 1$     [B]  $y = x + 7$     [C]  $y = x - 8$     [D]  $y = x + 1$     [E] No Slant Asym.

6) Determine which function represents the graph.

[A]  $f(x) = \frac{2x^2 - 5x + 5}{x - 2}$     [B]  $f(x) = \frac{x - 2}{x}$

[C]  $f(x) = \frac{2x^3 - x^2 - 2x + 1}{x^2 + 3x + 2}$     [D]  $f(x) = \frac{x^2}{x - 2}$

[E] None of these



For #7 – 11, perform the indicated operation.

7)  $\frac{2x}{x+4} + \frac{x^2+4}{x^2-16}$

- [A]  $\frac{1}{x+4}$     [B]  $\frac{(x+2)(x-2)}{(x+4)(x-4)}$     [C]  $\frac{x^2 - 8x - 4}{(x+4)(x-4)}$     [D]  $\frac{3x^2 - 8x + 4}{(x+4)(x-4)}$     [E] None of these

8)  $\frac{x^2 + 10x + 24}{x^2 - 16} \div \frac{x+6}{x-6}$

- [A]  $\frac{10x+6}{4}$     [B]  $\frac{x-6}{x-4}$     [C]  $\frac{x+4}{x-6}$     [D]  $\frac{x-10}{x-4}$     [E] None of these

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- 9)  $\frac{\frac{1}{x+2}}{\frac{4}{x}-3}$ , [A]  $\frac{3x+4}{12x-12}$  [B]  $\frac{x}{-3x^2-2x-8}$  [C]  $\frac{x}{-7x-14}$  [D]  $\frac{x+12}{-4x-8}$  [E] None of these
- 10)  $\frac{4}{x+2} + \frac{1}{x-2}$  [A]  $\frac{5x-6}{x^2-4}$  [B]  $\frac{5x-6}{4}$  [C]  $\frac{5}{x^2-4}$  [D]  $\frac{5}{x+2}$  [E] None of these
- 11)  $\frac{\frac{1}{x-3}}{-\frac{1}{x}-2}$  [A]  $\frac{x+2}{-x+3}$  [B]  $\frac{x}{-3x+9}$  [C]  $\frac{-x}{2x^2-5x-3}$  [D]  $-\frac{2x+1}{2x+2}$  [E] None of these
- 12) Solve:  $-\frac{8}{3x+1} - \frac{6x}{3x-1} = -2$  [A]  $x = \frac{1}{5}$  [B]  $x = \frac{1}{3}$  [C]  $x = -\frac{4}{3}$   
 [D]  $x = \frac{5}{3}$  [E] None of these
- 13) Solve and write the answer in interval notation.  $\frac{5x-5}{x-5} \geq 2$   
 [A]  $\left(-\infty, -\frac{5}{3}\right)$  [B]  $\left(-\infty, -\frac{5}{3}\right], (5, \infty)$  [C]  $[5, \infty)$  [D]  $\left[-\frac{10}{3}, 5\right), (5, \infty)$  [E] None of these
- 14) Determine which of the following is  $y = \left(\frac{1}{2}\right)^x$  shifted 3 units up and 4 units to the right.  
 [A]  $y = \left(\frac{1}{2}\right)^{x+3} + 4$  [B]  $y = \left(\frac{1}{2}\right)^{x-4} + 3$  [C]  $y = \left(\frac{1}{2}\right)^{x-4} - 3$  [D]  $y = \left(\frac{1}{2}\right)^{x-3} + 4$  [E] None of these
- 15) Determine which of the following is  $y = \log_2 x$  shifted 2 units down and 5 units to the left.  
 [A]  $y = \log_2(x-2) - 5$  [B]  $y = \log_2(x+5) + 2$  [C]  $y = \log_2(x+2) - 5$   
 [D]  $y = \log_2(x+5) - 2$  [E] None of these
- 16) Identify the asymptote of:  $y = \log_2(x-4) + 3$   
 [A]  $x = 3$  [B]  $x = 4$  [C]  $y = 4$  [D]  $y = 3$  [E] None of these
- 17) Identify the asymptote of:  $y = \left(\frac{1}{2}\right)^{x-4} + 6$  [A]  $x = 4$  [B]  $x = 6$  [C]  $y = 4$  [D]  $y = 6$
- 18) Write in exponential form:  $y = \log_2 x$  [A]  $x = 2^y$  [B]  $y = 2^x$  [C]  $x = y^2$  [D]  $2 = x^y$



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- 29) Given  $\tan \theta = \frac{4}{3}$  and  $\sin \theta > 0$ . find  $\cos \theta$ . [A]  $\frac{3}{5}$  [B]  $-\frac{4}{5}$  [C]  $\frac{4}{5}$   
 [D]  $-\frac{3}{5}$  [E] None of these
- 30) Find the exact value of  $\sec \frac{7\pi}{4}$ . [A]  $-\frac{\sqrt{3}}{2}$  [B]  $-\sqrt{3}$  [C]  $-\frac{\sqrt{2}}{2}$   
 [D]  $-\frac{\sqrt{3}}{3}$  [E] None of these
- 31) Evaluate:  $\arcsin\left(-\frac{1}{2}\right)$  [A]  $\frac{\rho}{6}$  [B]  $\frac{\rho}{3}$  [C]  $-\frac{\rho}{3}$   
 [D]  $\frac{2\rho}{3}$  [E] None of these
- 32) Evaluate:  $\sin\left(\arctan\frac{3}{8}\right)$  [A]  $\frac{8}{3}$  [B]  $\frac{\sqrt{73}}{8}$  [C]  $\frac{3\sqrt{55}}{55}$   
 [D]  $\frac{3\sqrt{73}}{73}$  [E] None of these
- 33) Add and simplify:  $\frac{1}{1+\cos x} + \frac{1}{1-\cos x}$  [A]  $\frac{2}{1-\cos x}$  [B] 0 [C]  $2\cot x \csc x$   
 [D]  $2\csc^2 x$  [E] None of these
- 34) Simplify.  $\sec^4 x + \sec^2 x - 2$  [A]  $2\tan^2 x$  [B]  $(\sec^2 x + 2)(\tan^2 x)$   
 [C]  $2\tan^4 x$  [D]  $\tan^2 x + 2$  [E] None of these
- 35) Simplify:  $\frac{\sin x - \sin^3 x}{\cos^4 x + \cos^2 x \sin^2 x}$  [A]  $\sin x$  [B]  $\cos x$  [C]  $\sin^2 x$   
 [D]  $\tan x \sin x$  [E] None of these
- 36) Find all solutions for  $\cos^2 x - (\cos^2 x - \sin^2 x) = 0$  on the interval  $[0, 2\rho)$ .  
 [A]  $0, \rho$  [B]  $0, \frac{\rho}{2}, \frac{3\rho}{2}$  [C]  $1, -1$  [D]  $\frac{\rho}{6}, \frac{5\rho}{6}, \frac{7\rho}{6}, \frac{11\rho}{6}$  [E] None of these
- 37) Find all solutions for  $\cos^2 x - 5\sin x + 5 = 0$  on the interval  $[0, 2\rho)$ .  
 [A]  $\frac{\rho}{6}, \frac{3\rho}{2}$  [B]  $0, \frac{\rho}{3}, \frac{2\rho}{3}$  [C]  $\frac{3\rho}{4}, \frac{7\rho}{4}$  [D]  $\frac{\rho}{2}$  [E] None of these

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38) Find all solutions for  $\tan x - \cot x = 0$  on the interval  $[0, \rho]$ .

- [A]  $\frac{\rho}{4}, \frac{3\rho}{4}$       [B]  $\frac{\rho}{6}, \frac{5\rho}{6}$       [C]  $\frac{\rho}{3}, \frac{2\rho}{3}$       [D]  $0, \frac{\rho}{2}, \rho$       [E] None of these

39) Simplify:  $\sin \frac{3\rho}{2} + x \frac{\rho}{\rho}$

[A]  $-\sin x$       [B]  $-\cos x$       [C]  $\sin \frac{3\rho}{2} + \sin x$   
 [D]  $-\cos x - \sin x$       [E] None of these

40) Given  $\sin u = -\frac{5}{13}, \rho < u < \frac{3\rho}{2}$  and  $\csc v = \frac{\sqrt{10}}{3}, \frac{\rho}{2} < v < \rho$ , use a sum/difference formula to find  $\sin(u + v)$ .

- [A]  $-\frac{3\sqrt{10}}{130}$       [B]  $-\frac{27\sqrt{10}}{130}$       [C]  $\frac{27\sqrt{10}}{130}$       [D]  $\frac{-120 + 13\sqrt{10}}{130}$       [E] None of these

41) Two ships leave a port at 9 AM. One travels at a bearing of N43°W at 10 miles per hour, and the other travels at a bearing of S67°W at 16 miles per hour. Approximately how far apart are they at noon? Round to the nearest mile.

- [A] 22 miles      [B] 47 miles      [C] 7 miles      [D] 15 miles      [E] None of these