

Chap 4 Sec 5

1. Give **equations** for the horizontal and vertical asymptotes

$$\text{a. } f(x) = \frac{3x(x-1)(x+2)}{5(x-2)^2(x+1)} = \frac{3x^3 + 3x^2 - 6x}{5x^3 - 15x^2 + 20}$$

$$\text{b. } f(x) = \frac{3x(x-1)(x+2)}{5(x-2)(x+1)} = \frac{3x^3 + 3x^2 - 6x}{5x^2 - 5x - 10}$$

$$\text{c. } f(x) = \frac{-7(x-90)^5(x+70)}{(x-30)^2(x+50)^4}$$

$$\text{d. } f(x) = \frac{-7(x+90)^8(x+70)^3}{5(x+30)^2(x+50)}$$

$$\text{e. } f(x) = \frac{-7(x-90)^5(x+70)}{5(x-30)^2(x+50)^4(x^2+x+1)}$$

$$\text{f. } f(x) = \frac{-4(x+40)(x-20)^2}{(x-50)^2} = \frac{-4x^3 + 4800x - 64000}{x^2 - 100x + 2500}$$

$$\text{g. } f(x) = \frac{-4(x+30)^2(x-50)}{x(x-40)} = \frac{-4x^3 - 40x^2 + 8400x + 180,000}{x^2 - 40x}$$

2. Give equations for the horizontal asymptote(s) for $f(x) = \frac{3(x-100)^2(x+200)}{5(x-200)^2(x+100)^2}$

a. $x = 0$

b. $x = 3/5$

c. $x = 100, -200$

d. $x = 200, -100$

e. there are none

ae. $y = 0$

be. $y = 3/5$

ce. $y = 100, -200$

de. $y = 200, -100$

3. Give equations for the vertical asymptote(s) for $f(x) = \frac{3(x-100)^2(x+200)}{5(x-200)^2(x+100)^2}$

a. $x = 0$

b. $x = 3/5$

c. $x = 100, -200$

d. $x = 200, -100$

e. there are none

ae. $y = 0$

be. $y = 3/5$

ce. $y = 100, -200$

de. $y = 200, -100$

4. Give equations for the vertical asymptote(s) for $f(x) = \frac{3(x-900)^5(x+700)^8}{5(x-200)^4(x+100)^9}$

a. $x = 0$

b. $x = 3/5$

c. $x = 100, -200$

d. $x = 200, -100$

e. there are none

ae. $y = 0$

be. $y = 3/5$

ce. $y = 100, -200$

de. $y = 200, -100$

5. Give equations for the horizontal asymptote(s) for $f(x) = \frac{3(x-900)^5(x+700)^8}{5(x-200)^4(x+100)^9}$

a. $x = 0$

b. $x = 3/5$

c. $x = 100, -200$

d. $x = 200, -100$

e. there are none

ae. $y = 0$

be. $y = 3/5$

ce. $y = 100, -200$

de. $y = 200, -100$

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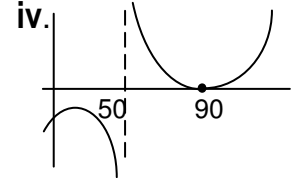
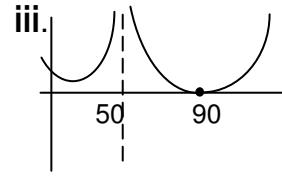
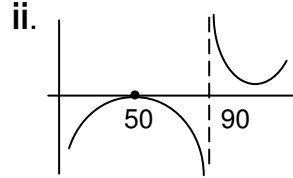
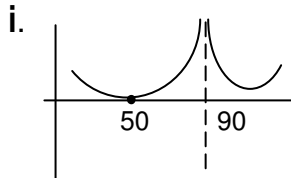
6. For each function **a. – d.** choose the correct graph based on location of the vertical asymptote and behavior near that asymptote.

a. $f(x) = \frac{73(x-50)^8}{(x-90)^5}$

b. $f(x) = \frac{73(x-50)^8}{(x-90)^4}$

c. $f(x) = \frac{73(x-90)^{10}}{(x-50)^6}$

d. $f(x) = \frac{73(x-90)^8}{(x-50)^5}$



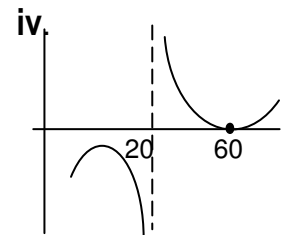
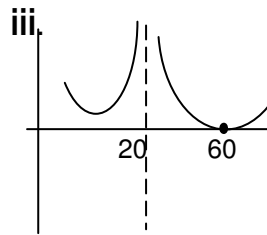
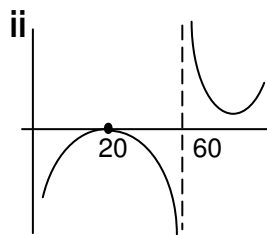
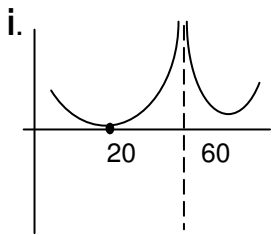
7. For each function **a. – d.** choose the correct graph based on location of the vertical asymptote and behavior near that asymptote.

a. $f(x) = \frac{51(x-20)^8}{(x-60)^5}$

b. $f(x) = \frac{51(x-60)^8}{(x-20)^5}$

c. $f(x) = \frac{51(x-60)^8}{(x-20)^6}$

d. $f(x) = \frac{51(x-20)^8}{(x-60)^4}$



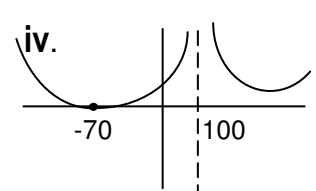
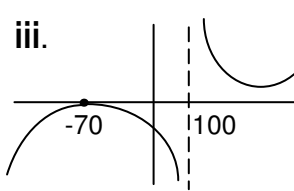
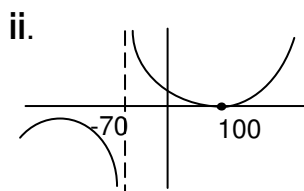
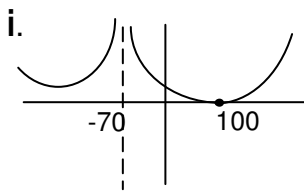
8. For each function **a. – d.** choose the correct graph based on location of the vertical asymptote and behavior near that asymptote.

a. $y = \frac{902(x-100)^{26}}{(x+70)^{20}}$

b. $y = \frac{902(x+70)^{20}}{(x-100)^{20}}$

c. $y = \frac{902(x+70)^{22}}{(x-100)^{19}}$

d. $y = \frac{902(x-100)^{28}}{(x+70)^{21}}$



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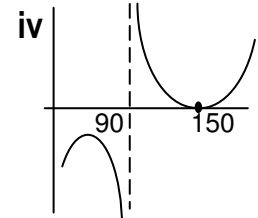
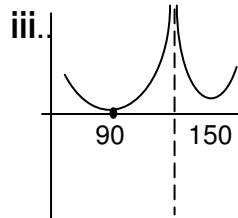
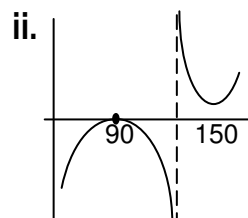
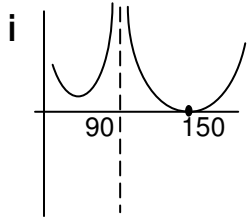
9. For each function **a.** – **d.** choose the correct graph based on location of the vertical asymptotes and behavior near those asymptotes.

$$\text{a. } f(x) = \frac{17(x-90)^8}{(x-150)^5}$$

$$\text{b. } f(x) = \frac{17(x-90)^6}{(x-150)^4}$$

$$\text{c. } f(x) = \frac{17(x-150)^{10}}{(x-90)^5}$$

$$\text{d. } f(x) = \frac{17(x-150)^{14}}{(x-90)^6}$$



10. Write $y = \frac{3\sqrt{x} - 7x^2 + x^5}{x^5}$ as a sum of multiples of powers of x (no fractions and no radicals).

11. Write $y = \frac{3\sqrt{x} + x^2 + x^5}{x^2}$ as a sum of multiples of powers of x (no fractions and no radicals).

12. Write $y = \frac{-4x^2 + x^5 - 9\sqrt{x}}{x^5}$ as a sum of multiples of powers of x (no fractions and no radicals).

13. Solve exactly $4(x+7)^{-8}(x-3)^{15} - 7(x+7)^{-7}(x-3)^{14} = 0$

14. Solve exactly $4(x+2)^{-8}(x-3)^{-4} - 3(x+2)^{-9}(x-3)^{-3} = 0$

15. Solve exactly $2(x+2)^{-5/3}(x-3)^{3/5} + 3(x+2)^{-2/3}(x-3)^{-2/5} = 0$

16. Solve $\frac{3x^2}{x+2} + 6 = \frac{12}{x+2}$

17. Solve $1 - \frac{3}{x-2} = \frac{9x+18}{x-2}$

18. Solve $x - \frac{4x-16}{x+4} = \frac{32}{x+4}$

19. Solve $x - \frac{x-1}{x+1} = \frac{2}{x+1}$

20. Solve $\frac{2x-10}{x+5} + 1 = \frac{16}{x+5}$

21. Solve $\frac{2}{x-4} + \frac{x}{x-4} = x$

Answers:

1.

a. VA: $x = 2, -1$; HA: $y = 3/5$

b. VA: $x = 2, -1$; HA: none

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c. VA: $x = 30, -50$; HA: $y = -7$

d. VA: $x = -30, -50$; HA: none

e. VA: $x = 30, -50$; HA: $y = 0$

f. VA: $x = 2, -1$; HA: none;

g. VA: $x = 0, 40$; HA: none

2. ae

3. d

4. c

5. be

6. ii, i, iii, iv

7. ii, iv, iii, i

8. i, iv, iii, ii

9. iv, iii, ii, i

10. $3x^{-4.5} - 7x^{-3} + 1$

11. $3x^{-1.5} + 1 + x^3$

12. $-4x^{-3} + 1 - 9x^{-4.5}$

13. $(x + 7)^{-8}(x - 3)^{14}[4(x - 3) - 7(x + 7)] = 0$ $4x - 12 - 7x - 49 = 0 - 3x = 61$

$x = -7, 3, -61/3$

14. $(x + 2)^{-9}(x - 3)^{-4}[4(x + 2) - 3(x - 3)] = 0$ $4x + 8 - 3x + 9 = 0$

$x + 17 = 0$

$x = -17$

15. $(x + 2)^{-5/3}(x - 3)^{-2/5}[2(x - 3) + 3(x + 2)] = 0$ $2x - 6 + 3x + 6 = 0$

$5x = 0$

$x = -2, 3, 0$

16. $3x^2 + 6(x + 2) = 12$ $3x^2 + 6x = 0$ $x = 0, -2$

17. $-23/8$

18. $x(x + 4) - (4x - 16) = 32$ $x^2 - 16 = 0$ $4, -4$

19. $1, -1$

20. $21/3$

21. $\frac{5 \pm \sqrt{33}}{2}$