

HPC/PC: Graphs of Rational Functions

Name KEY

Find any asymptotes (Vertical or End Behavior) and the Domain of the following functions:

1.  $f(x) = \frac{1}{x+3}$   
 V.A.  $x+3=0$   
 $x=-3$   
 E.B.  $n < m$   
 $n=0$   
 $m=1$   $y=0$

Domain:  $(-\infty, -3) \cup (-3, \infty)$

2.  $f(x) = \frac{2x^2-1}{x^2+3}$   
 V.A.  $x^2+3=0$   
 $x^2=-3$   
 $x=\sqrt{-3}$   
 No V.A.  $\uparrow$   
 Domain:  $\mathbb{R}$

E.B.  $n=2$   $m=2$   
 $n=m$   
 $y = \frac{2}{1}$   
 $y=2$

3.  $f(x) = \frac{x-3}{x^2+3x}$   
 V.A.  $x^2+3x=0$   
 $x(x+3)=0$   
 $x=0$   $x+3=0$   
 $x=-3$   
 E.B.  $n=1$   $m=2$   
 $n < m$   
 $y=0$

Domain:  $(-\infty, -3) \cup (-3, 0) \cup (0, \infty)$

4.  $f(x) = \frac{x-2}{x^2-2x-3}$   
 V.A.  $x^2-2x-3=0$   
 $(x+1)(x-3)=0$   
 $x+1=0$   $x-3=0$   
 $x=-1$   $x=3$

E.B.  $n=1$   $m=2$   
 $n < m$   
 $y=0$

Domain:  $(-\infty, -1) \cup (-1, 3) \cup (3, \infty)$

5.  $f(x) = \frac{-3x^2+x+12}{x^2-4}$   
 V.A.  $x^2-4=0$   
 $x^2=4$   
 $x=\pm 2$   
 E.B.  $n=2$   $m=2$   
 $n=m$   
 $y = \frac{-3}{1}$   $y=-3$

Domain:  $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

6.  $f(x) = \frac{2x+1}{x^2-x}$   
 V.A.  $x^2-x=0$   
 $x(x-1)=0$   
 $x=0$   $x-1=0$   
 $x=1$   
 E.B.  $n=1$   $m=2$   
 $n < m$   
 $y=0$

Domain:  $(-\infty, 0) \cup (0, 1) \cup (1, \infty)$

7.  $f(x) = \frac{x^2-x-2}{x^2-2x-8}$   
 V.A.  $x^2-2x-8=0$   
 $(x+2)(x-4)=0$   
 $x+2=0$   $x-4=0$   
 $x=-2$   $x=4$   
 E.B.  $n=2$   $m=2$   
 $n=m$   
 $y=1$

Domain:  $(-\infty, -2) \cup (-2, 4) \cup (4, \infty)$

8.  $f(x) = \frac{2x^5+x^2-x+1}{x^2-1}$   
 V.A.  $x^2-1=0$   
 $x^2=1$   
 $x=\pm 1$   
 Domain:  $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$   
 E.B.  $n=5$   $m=2$   
 $n > m$   
 ~~$x = \frac{2x^5 + x^2 - x + 1}{x^2 - 1}$~~   
on back