Name: _____ **Precalculus Unit 5, Lesson 2**

Aim: How do we find horizontal and vertical asymptotes?

I. Do Now:

1. What value(s) of x make each function undefined?

   (a) $f(x)=\dfrac{2x}{x-3}$ (b) $g(x)=\dfrac{x-5}{x^2-9}$ (c) $h(x)=\dfrac{8}{x^2+2}$

2. As $x\to\infty$ or $x\to-\infty$, what value does each fraction approach? (Try substituting a very large number, like 1,000,000, for x.)

   (a) $f(x)=\dfrac{1}{x}$ (b) $g(x)=\dfrac{2x^2+1}{x^2}$ (c) $h(x)=\dfrac{x^2-3}{2x}$

II. Rules for Asymptotes of Rational Functions

Vertical Asymptotes (VA): There can be from 0 to an infinite number of vertical asymptotes. To find VA, find all values of x that make the fraction undefined.

Horiztonal Asymptotes (HA): There is at most 1 horizontal asymptote for a rational function.

Consider the degree of the numerator and the denominator and look at their leading coefficients (i.e., the terms with the highest exponent.)

• If the degree of the numerator is less than the degree of the denominator, then _____

• If the degree of the numerator is equal to the degree of the denominator, then _____

• If the degree of the numerator is greater than the degree of the denominator, then _____

III. Examples: For each rational function, state the equations of all VA and HA.

3. $f(x)=\dfrac{2x+1}{x+1}$	4. $g(x)=\dfrac{6}{x+2}$	5. $h(x)=\dfrac{-2x^3}{x^2-4}$	6. $h(x)=\dfrac{2x^2}{3x^2+1}$
VA: _____	VA: _____	VA: _____	VA: _____
HA: _____	HA: _____	HA: _____	HA: _____
7. $f(x)=\dfrac{2x^2}{x+\pi}$	8. $g(x)=\dfrac{1-x}{x}$	9. $g(x)=\dfrac{7}{x(x-2)(x-3)}$	10. $h(x)=\dfrac{7x^4}{x^4-1}$
VA: _____	VA: _____	VA: _____	VA: _____
HA: _____	HA: _____	HA: _____	HA: _____

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p. 147: 9, 10 (disregard directions; state domain and equations of VA and HA)
p. 147: 11, 12, 15
p. 141: 58