Precalculus Unit 1 worksheet: Slant asymptotes

Name _____ Date _____ Period _____

1. Each function has a slant asymptote. Without dividing, give the slope of that asymptote.

(a) $\dfrac{6x^3 - x + 2}{4x^2 + 1}$

(b) $\dfrac{-5x^2 + 2x}{10x + 3}$

(c) $\dfrac{2x^5 + 1}{3x^4 - x^3}$

(d) $\dfrac{x^2 + 7}{-4x + 1}$

2. Divide, and write each function as a quotient plus a remainder over the denominator. Then give the slant asymptote and any vertical asymptotes.

(a) $\dfrac{x^2 - 4x + 7}{x - 3}$

(b) $\dfrac{6x^2 - 5x + 1}{3x + 2}$

(c) $\dfrac{x^3 + 2x^2 - x + 5}{x^2 + 3}$

(d) $\dfrac{-2x^3 + x^2 + 4}{x^2 - x}$

3. For each function, say what its graph does far out: approaches a horizontal line, approaches a slant line, follows a curve that is not a line, or is itself a line with a hole. Give the line when there is one.

(a) $\dfrac{5x^2 - 1}{2x^2 + x}$

(b) $\dfrac{x^2 + x - 12}{x - 3}$

(c) $\dfrac{x^4 + x}{x^2 - 5}$

(d) $\dfrac{3x^3 - 2x^2 + 1}{x^2 + 4}$

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4. The denominator of $f(x) = \dfrac{4x^2 - 2x - 18}{2x - 5}$ is 0 at $x = \dfrac{5}{2}$. Use synthetic division by $\dfrac{5}{2}$ to find the slant asymptote of f and its vertical asymptote. Watch the leading coefficient 2 of the denominator.

5. Diego runs the math club's calendar fundraiser. Printing n calendars costs $C(n) = 0.02n^2 + 5n + F$ dollars: a one-time setup fee of F dollars, 5 dollars of paper and ink per calendar, and a binding charge that grows faster for big orders. The average cost per calendar is $A(n) = \dfrac{C(n)}{n}$.

(a) Find the slant asymptote of A.

(b) For an order of 100 calendars, the print shop's quote shows an average cost 5 dollars above the slant line. Find the setup fee F.

(c) Find the average cost per calendar for that order.

6. Let $h(x) = 3x + 1 + 5(0.5)^x$. This is not a rational function.

(a) Show that $y = 3x + 1$ is a slant asymptote of h on the right, and say which side of the line the graph is on there. Find the gap at $x = 10$.

(b) Find the gap at $x = -10$, and explain why $y = 3x + 1$ is not an asymptote on the left.

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