# Precalculus Unit 1 quiz 3: Slant asymptotes, Polynomial and rational inequalities with sign charts

Name _____ Date _____ Period _____

8 questions, 20 points

**1.** Find the slant asymptote and the vertical asymptote of each function. (2 points)

(a) $\dfrac{x^2+6x+1}{x+2}$ (b) $\dfrac{3x^2-7x+5}{x-2}$

**2.** Let $k(x)=\dfrac{x^2+c}{x-2}$, where $c$ is a constant. For which values of $c$ is the graph of $k$ above its slant asymptote far to the right? (2 points)

**3.** Solve $18x^2-3x^3>x^4$. Write the answer in interval notation. (2 points)

**4.** Solve $x^3\le 3x+2$. Start by finding a whole-number zero of $x^3-3x-2$. (2 points)

**5.** Samir wants the slant asymptote of $f(x)=\dfrac{4x^2-3x+1}{2x+1}$. He says: "Far out, the constant terms do not matter, so $f(x)\approx\dfrac{4x^2-3x}{2x}=2x-\dfrac{3}{2}$, and the slant asymptote is $y=2x-\dfrac{3}{2}$." (3 points)

(a) Find the slant asymptote by division.

(b) Which of the two constants Samir dropped changes the answer, and why?


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**6.** Let $f(x) = \dfrac{6x^2 + bx + 1}{3x - 2}$. (3 points)

(a) Find $b$ so that the slant asymptote of $f$ passes through the origin.

(b) For that $b$, say which side of the slant asymptote the graph is on far to the right and far to the left.

**7.** Solve $\dfrac{x+5}{x-1} \geq \dfrac{x-1}{x+1}$. (3 points)

**8.** (3 points)

(a) Write a rational inequality whose solution set is $(-\infty, -2) \cup [3, \infty)$.

(b) Change only the inequality sign in your answer to (a) so that the solution set becomes $(-2, 3]$. Explain why $-2$ is left out of both sets.


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