Unit 3 Test Tune-up

$f(x) = \ldots\ldots$

$$\frac{3x^3 - 12x^2 - 21x + 30}{2x^3 + 4x^2 - 78x + 144} = \frac{3(x-5)(x+2)(x-1)}{2(x-3)^2(x+8)} = \frac{3}{2} + \frac{-18x^2 + 96x - 186}{2x^3 + 4x^2 - 78x + 144}$$

a. What are the real zeroes of $f(x)$? ____________________

b. What is the equation of the horizontal asymptote of the graph of $f(x)$? ____________________

c. What is the equation of the oblique asymptote of the graph of $f(x)$? ____________________

d. What are the equations of the vertical asymptotes of the graph of $f(x)$? ____________________

e. Describe the exact locations of any removable discontinuities. ____________________

f. What is the y-intercept of the graph of $f(x)$? ____________________

g. Describe the end behavior of $f(x)$ using the correct notation.

h. Write the partial fraction decomposition "template" for $f(x)$.

Factor: $x^3 + 125$

Factor: $x^3 - 8$

If you did not get a chance to do the 3 review problems on the last page of Lesson 3-4, please do them now. **(Answers on next slide)**

Lesson 3-4 HW

Review:

1. Evaluate: $\lim_{x \to -2} \frac{x^2 - 4}{x^3 + 8}$

$\frac{(x+2)(x-2)}{(x+2)(x^2-2x+4)}$

$\frac{-2-2}{(-2)^2-2(-2)+4} = \frac{-4}{4+4+4} = -\frac{1}{3}$

$\lim_{x \to 1} \frac{\sqrt{3} - \sqrt{x+2}}{1-x} \cdot \frac{\sqrt{3}+\sqrt{x+2}}{\sqrt{3}+\sqrt{x+2}}$

$\frac{3-(x+2)}{(1-x)(\sqrt{3}+\sqrt{x+2})} =$

$\frac{3-x-2}{(1-x)(\sqrt{3}+\sqrt{x+2})} = \frac{1-x}{(1-x)(\sqrt{3}+\sqrt{x+2})}$

$\frac{1}{\sqrt{3}+\sqrt{x+2}} = \frac{1}{\sqrt{3}+\sqrt{3}}$

$= \frac{1}{2\sqrt{3}}$

2. Solve for x: $\begin{vmatrix} x+4 & -2 \\ 7 & x-5 \end{vmatrix} = 0$

$(x+4)(x-5) - -14 = 0$

$x^2 - x - 20 + 14 = 0$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$ $\quad x = 3,\ x = -2$

3. Completely analyze the following function: $f(x) = \frac{6x^2 - 7x + 2}{4x^2 - 1} = \frac{(3x-2)(2x-1)}{(2x+1)(2x-1)}$

x-int: $(\frac{2}{3}, 0)$

y-int: $(0, -2)$

V.A.: $x = -\frac{1}{2}$ → $\lim_{x \to -\frac{1}{2}^-} f(x) = \infty$, $\lim_{x \to -\frac{1}{2}^+} f(x) = -\infty$

H.A.: $y = \frac{3}{2}$ → $\lim_{x \to -\infty} f(x) = \frac{3}{2} = \lim_{x \to \infty} f(x)$

R.D.: $x = \frac{1}{2}$

hole: $(\frac{1}{2}, -.25)$