-4Name _____ Accelerated PreCal FBM 1 Study Guide

Material covered on Thursday's benchmark:

- Ch 13 (Sections 1, 2, 3, 5): Rat[illegible] and Equations
- Section 13.4: Rational Functions
- Exponential Functions & Previous Funct[illegible] Knowledge

1) Joanna's pay for working overtime, *p*, varies jointly as the number of hours she works, *n*, and her hourly pay rate, *r*, and *p=$103.44* when *n=8 hours* and *r=$8.62*. Find n when *p=$213.75* and *r=$9.50*.

$n = 15$ hours

2) The cost of packing boxes, *c*, varies inversely with the number of boxes, *b*, purchased. If *c=$0.75* when *b=20*, determine the cost of packing 5 boxes.

$C = \$3.00$

3) The time required to process a shipment of goods at Wal-Mart varies directly with the number of items in the shipment and inversely with the number of workers assigned. If 15,000 items can be processed by 8 workers in 10 hours, then how long would it take 12 workers to process 20,000 items?

$t = 8.9$ hours

Simplify the following rational expressions.

4) $\frac{x+1}{x^2-7x-18} \div \frac{7x^2}{7x^3+14x^2}$

$\frac{x+1}{x-9}$

5) $\frac{3x^2+18x}{x^2+x-30}$

$\frac{3x}{x-5}$

6) $\frac{x^2+6x+5}{6x+6} \cdot \frac{x-6}{5x^2+25x} \cdot \frac{15x-30}{3}$

$\frac{(x-6)(x-2)}{6x}$

7) $\frac{x}{x+3} + \frac{2x+6}{x^2+6x+9}$

$\frac{x+2}{x+3}$

8) $\frac{2x^2+64}{x^2-64} - \frac{x-4}{x+8}$

$\frac{x+4}{x-8}$

9) $\frac{2}{y+3} - \frac{y}{y-1} + \frac{y^2+2}{y^2+2y-3}$

$\frac{-y}{(y+3)(y-1)}$

10) $\dfrac{\frac{x}{x+2}}{2x+\frac{x}{5}}$

$\dfrac{5}{11(X+2)}$

11) $\dfrac{\frac{x^2+8x+15}{x^2+x-6}}{\frac{x^2+2x-15}{x^2-2x-3}}$

$\dfrac{X+1}{X-2}$

12) $\dfrac{20x^4}{x^2y}\cdot\dfrac{x^3}{6y^3}\div\dfrac{10x^2y}{12y^6}$

$4x^3y$

13) $\dfrac{x^2+13x+42}{x^3-2x^2-63x}$

$\dfrac{X+6}{X(X-9)}$

14) $\dfrac{\frac{1}{2}+\frac{1}{x}}{\frac{1}{4}-\frac{1}{x^2}}$

$\dfrac{2X}{X-2}$

15) $\dfrac{x}{6x+24}-\dfrac{4}{x^2+2x-8}$

$\dfrac{X-6}{6(X-2)}$

Solve and check for extraneous solutions.

16) $x-\frac{6}{x}=5$

$X=-1,6$

17) $\frac{2}{d+2}+\frac{8}{d-2}=\frac{14}{d^2-4}$

$d=1/5$

18) $\frac{4}{x^2-4}=\frac{1}{x-2}$

No solution

Find the characteristics listed of the rational fun

19) $f(x)=-\frac{2}{x+5}-1$

Vertical Asymptote: $X=-5$

Horizontal Asymptote: $y=-1$

Domain: $(-\infty,-5)\cup(-5,\infty)$

Range: $(-\infty,-1)\cup(-1,\infty)$

21) Write a rational function with a hole located at $x=-3$, vertical asy
asymptote of $y=3$.

$f(X)=\dfrac{3X^2+7X-6}{X^2-X-12}$

22) Write a rational function with a hole located at $x=0$, vertical asym
asymptote of $y=0$.

f(X)

Find the characte

23) $f(x)=$

VA

HA

SA

Find the characteristics listed of the rational function. Then describe the transformations.

19) $f(x) = -\frac{2}{x+5} - 1$

Vertical Asymptote: $x=-5$

Horizontal Asymptote: $y=-1$

Domain: $(-\infty,-5)\cup(-5,\infty)$

Range: $(-\infty,-1)\cup(-1,\infty)$

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

Vertical Asymptote: $x=3$

Horizontal Asymptote: $y=2$

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

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

21) Write a rational function with a hole located at $x = -3$, vertical asymptotes at $x = 4$, zero of $x = \frac{2}{3}$, and horizontal asymptote of $y = 3$.

$$f(x) = \frac{3x^2+7x-6}{x^2-x-12}$$

22) Write a rational function with a hole located at $x = 0$, vertical asymptotes at $x = -9$ *and* $\frac{1}{6}$ and horizontal asymptote of $y = 0$.

$$f(x) = \frac{x}{6x^3+53x^2-9x}$$

Find the characteristics of each rational function.

23) $f(x) = \frac{2x^2-5x-3}{x^2+4x-21}$

VA $x=-7$

HA $y=2$

SA None

Zeros $x=-1/2$

Holes $x=3$

24) $f(x) = \frac{x^2+6x+5}{x-2}$

VA $x=2$

HA None

SA $y=x+8$

Zeros $-5,-1$

Holes None

25) $f(x) = \frac{x}{x^2-9}$

VA $x=\pm 3$

HA $y=0$

SA None

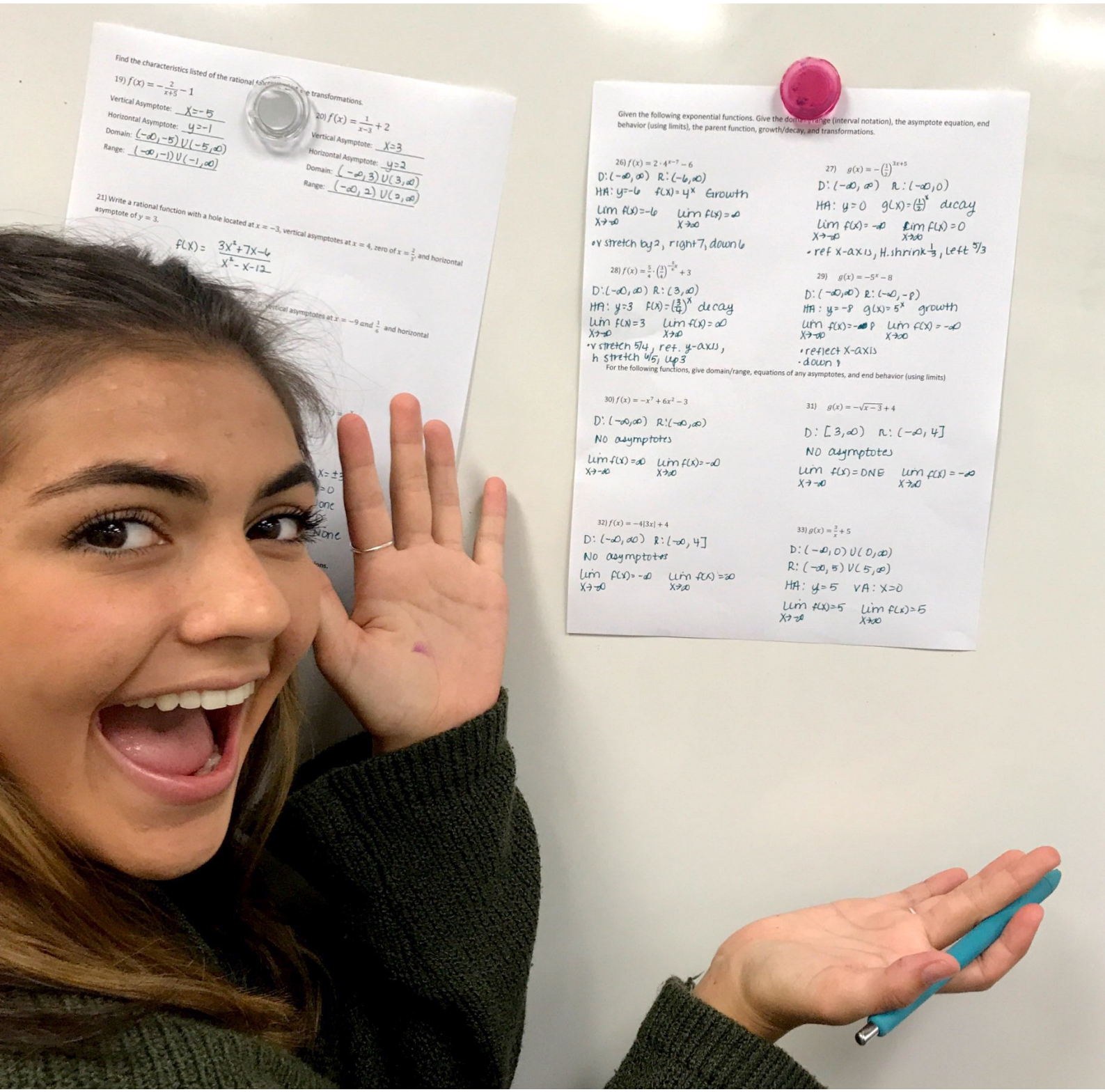
Zeros $0$

Holes None

**Write Question #~~24~~ 23 in the translated form of $f(x) = \frac{a}{x-h} + k$ and List All Transformations.**

$$f(x) = \frac{-13}{x+7} + 2$$

- reflection x-axis
- y stretch by 13
- left 7
- up 2



Find the characteristics listed of the rational functions and the transformations.

19) $f(x) = -\frac{2}{x+5} - 1$

Vertical Asymptote: $x = -5$

Horizontal Asymptote: $y = -1$

Domain: $(-\infty, -5) \cup (-5, \infty)$

Range: $(-\infty, -1) \cup (-1, \infty)$

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

Vertical Asymptote: $x = 3$

Horizontal Asymptote: $y = 2$

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

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

21) Write a rational function with a hole located at $x = -3$, vertical asymptotes at $x = 4$, zero of $x = \frac{2}{3}$, and horizontal asymptote of $y = 3$.

$f(x) = \frac{3x^2 + 7x - 6}{x^2 - x - 12}$

Given the following exponential functions. Give the domain/range (interval notation), the asymptote equation, end behavior (using limits), the parent function, growth/decay, and transformations.

26) $f(x) = 2 \cdot 4^{x-7} - 6$

D: $(-\infty, \infty)$ R: $(-6, \infty)$

HA: $y = -6$ $f(x) = 4^x$ Growth

$\lim_{x \to -\infty} f(x) = -6$ $\lim_{x \to \infty} f(x) = \infty$

• V stretch by 2, right 7, down 6

27) $g(x) = -\left(\frac{1}{2}\right)^{3x+5}$

D: $(-\infty, \infty)$ R: $(-\infty, 0)$

HA: $y = 0$ $g(x) = \left(\frac{1}{2}\right)^x$ decay

$\lim_{x \to -\infty} f(x) = -\infty$ $\lim_{x \to \infty} f(x) = 0$

• ref X-axis, H. shrink $\frac{1}{3}$, left $5/3$

28) $f(x) = \frac{5}{4} \cdot \left(\frac{3}{4}\right)^{-\frac{1}{5}x} + 3$

D: $(-\infty, \infty)$ R: $(3, \infty)$

HA: $y = 3$ $f(x) = \left(\frac{3}{4}\right)^x$ decay

$\lim_{x \to -\infty} f(x) = 3$ $\lim_{x \to \infty} f(x) = \infty$

• V stretch $5/4$, ref. y-axis, h stretch $4/5$, up 3

29) $g(x) = -5^x - 8$

D: $(-\infty, \infty)$ R: $(-\infty, -8)$

HA: $y = -8$ $g(x) = 5^x$ growth

$\lim_{x \to -\infty} f(x) = -8$ $\lim_{x \to \infty} f(x) = -\infty$

• reflect X-axis

• down 8

For the following functions, give domain/range, equations of any asymptotes, and end behavior (using limits)

30) $f(x) = -x^7 + 6x^2 - 3$

D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

NO asymptotes

$\lim_{x \to -\infty} f(x) = \infty$ $\lim_{x \to \infty} f(x) = -\infty$

31) $g(x) = -\sqrt{x-3} + 4$

D: $[3, \infty)$ R: $(-\infty, 4]$

NO asymptotes

$\lim_{x \to -\infty} f(x) = DNE$ $\lim_{x \to \infty} f(x) = -\infty$

32) $f(x) = -4|3x| + 4$

D: $(-\infty, \infty)$ R: $(-\infty, 4]$

No asymptotes

$\lim_{x \to -\infty} f(x) = -\infty$ $\lim_{x \to \infty} f(x) = \infty$

33) $g(x) = \frac{3}{x} + 5$

D: $(-\infty, 0) \cup (0, \infty)$

R: $(-\infty, 5) \cup (5, \infty)$

HA: $y = 5$ VA: $x = 0$

$\lim_{x \to -\infty} f(x) = 5$ $\lim_{x \to \infty} f(x) = 5$