Midterm from last fall?

Homework:

context.

I'm NOT looking for answers copied from the book. Homework's a learning tool. Use it!

§3.4

http://www.harryzaims.com/121-all/121-fall-13/

The most recent/relevant tests:

http://www.harryzaims.com/121-all/121-fall-11/practice-tests/1202-fall-12/

7. Write an equation in point-slope form of the line through $P(3, -7)$ that is parallel to the line $y = \frac{2}{7}x + \frac{11}{97}$

$y = m(x - x_1) + y_1$

$y = \frac{2}{7}(x-3) - 7$

New y = slope * change in x + old y-value

change in y

$y = f(x) = x$

$y = \frac{2}{7}f(x-3) - 7$

$\frac{2}{7}(x-3) - 7$

View ALL lines as transformations on $y = x$.

9. Let $f(x)=\frac{x+5}{x-7}$ and $g(x)=\sqrt{x+3}$.

a. What is the domain of f?

$\mathcal{D}(f) = \{x \mid x \neq 7\} = (-\infty, 7) \cup (7, \infty)$

$\mathcal{D}(g) = \{x \mid x+3 \geq 0\} = \{x \mid x \geq -3\} = [-3, \infty)$

$(f \circ g)(x) = \frac{\sqrt{x+3}+5}{\sqrt{x+3}-7} = f(g(x))$

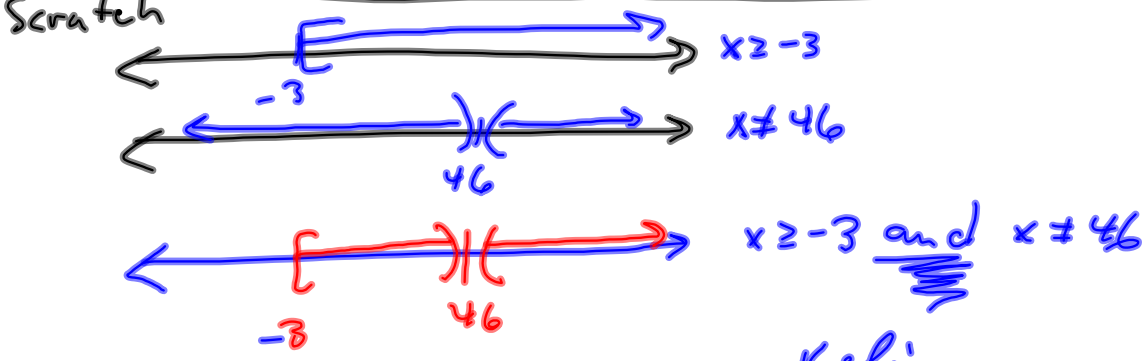
$\mathcal{D}(f \circ g) = \{x \mid x \in \mathcal{D}(g) \text{ and } g(x) \in \mathcal{D}(f)\}$

$= \{x \mid x \geq -3 \text{ and } \sqrt{x+3} \neq 7\}$

$= \{x \mid x \geq -3 \text{ and } x \neq 46\} = [-3, 46) \cup (46, \infty)$

Set-builder Interval

Scratch



Kelli:

$\sqrt{x+3} \neq 7$

$x+3 \neq 49 \Rightarrow x \neq 46$

5. Write the quadratic function $f(x) = x^2 - 10x + 21$ in the form $y = a(x-h)^2 + k$ and sketch its graph. Your graph should be "true to the essence of the parabola" and include the following points, clearly labeled as ordered pairs on the graph (and this is the last time I'm telling you how to label key points).
   i. Vertex
   ii. Any x- and y-intercepts

$x^2 - 10x + 21$

$= x^2 - 10x + 5^2 - 25 + 21$

$= (x-5)^2 - 4 = f(x)$

y-int: (0,21)

$(h,k) = (5,-4)$

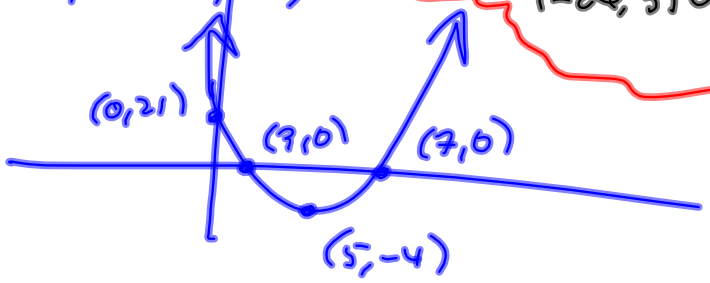
Followup:

$x^2 - 10x + 21 > 0$

+ | − | +

Y 3 N 7 Y

$(-\infty, 3) \cup (7, \infty)$



SET $= 0$ ⟹

$(x-5)^2 - 4 = 0$

$(x-5)^2 = 4$

$x - 5 = \pm 2$

$x = 5 \pm 2$

7 ⇝ (7,0)

3 ⇝ (3,0)

x-ints

M2

$x^2 - 10x + 21$

$a=1,\ b=-10,\ c=21$

$-\frac{b}{2a} = h = \frac{-(-10)}{2(1)} = 5 = h$

$k = f(h) = f(-\frac{b}{2a}) = f(5)$

$= 5^2 - 10(5) + 21$

$= 25 - 50 + 21$

$= 46 - 50 = -4 = k$

$(h,k) = (5,-4)$

$a(x-h)^2 + k$

$= 1(x-5)^2 - 4$

M2a

$(x-7)(x-3) = 0$

$x = 3, 7$

M2b

$b^2 - 4ac = (-10)^2 - 4(1)(21)$

$= 100 - 84 = 16$

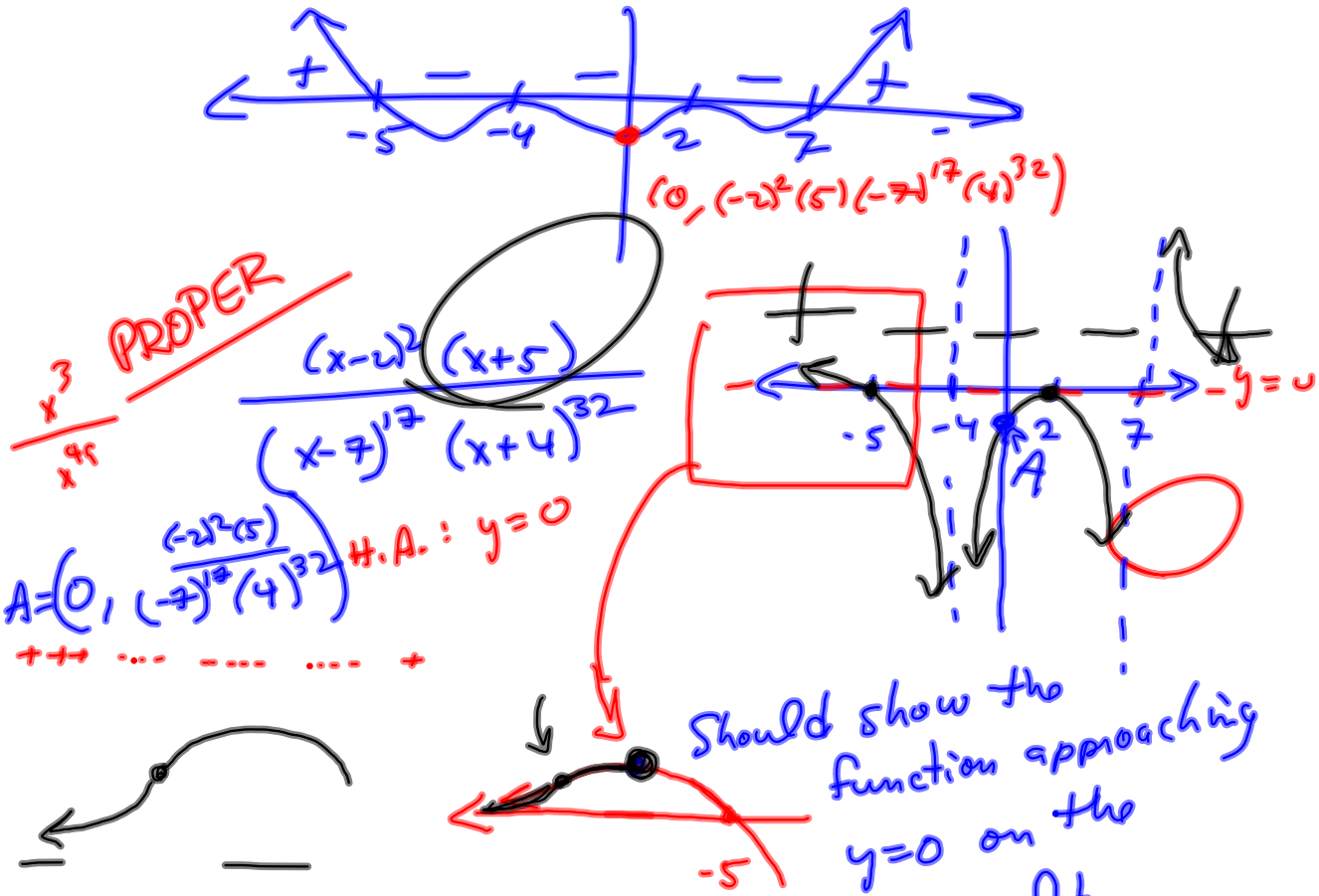
$x = \frac{10 \pm \sqrt{16}}{2(1)}$

$= \frac{10 \pm 4}{2} = \frac{5 \pm 2}{1}$ → 7, 3

Solve $x^2 - 10x + 21 > 0$ by using the zeros & a number line.

Sketch

$(x-2)^2(x+5)(x-7)^{17}(x+4)^{32}$



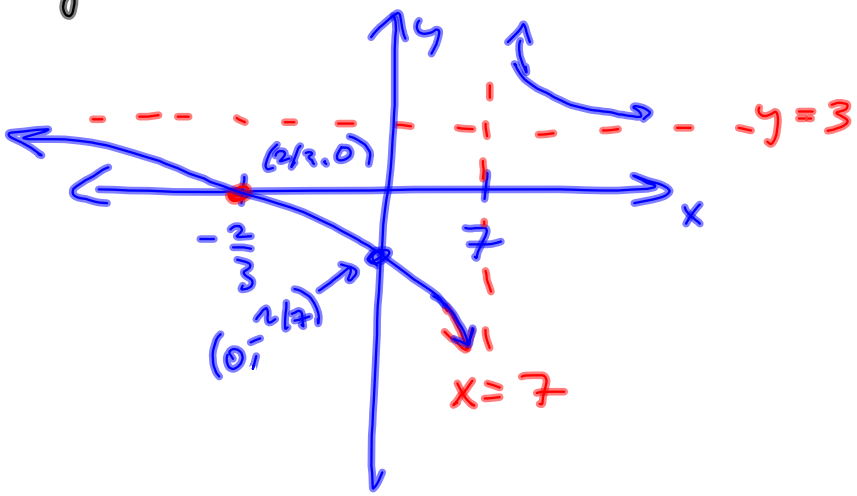
Yes, you can cross a horizontal asymptote. But $|x| \to$ big & you're close to, but not touching the H.A.

$\frac{\text{Linear}}{\text{Linear}}$ in class

Find oblique asymptote in class

$y = \frac{3x+2}{(x-7)^1}$ $\quad 3(x+\frac{2}{3})^1$

H.A.: $y = 3$



Find oblique asymptote

$f(x) = \frac{5x^4 - 3x^2 + 7x - 2}{x^3 - 7}$

$\frac{5x^4}{x^3} = 5x$

$y = 5x$ is O.A.

$$\begin{array}{r|l} x^3 - 7 & 5x^4 + 0x^3 - 3x^2 + 7x - 2 \\ & 5x \\ \hline & -(5x^4 \quad -35x) \\ \hline & -3x^2 + 42x - 2 \end{array}$$

r

Remark

$\frac{5x^4 - 3x^2 + 7x - 2}{x^3 - 7} = 5x + \frac{-3x^2 + 42x - 2}{x^3 - 7}$

$3\overline{)29}$ $\quad 9 \text{ r } 2$

$\frac{29}{3} = 9 + \frac{2}{3}$