Homework 4.1 – Analyzing Rational Functions

1. (1 pt) alfredLibrary/AUCI/chapter4/lesson1/quiz/combine1pet.pg

Consider the expression $\frac{x^2}{x-3}-\frac{4}{x-4}$.

(a) Combine the two terms and enter the result in *reduced* form as a ratio of polynomials by eliminating all parentheses. (Hint: Find a common denominator.)

$$\frac{x^2}{x-3}-\frac{4}{x-4}=\_\_\_\_\_$$

(b) Use long division to rewrite the answer to part (a) in proper form, $Q(x)+\frac{R(x)}{D(x)}$, where $D(x)=x^2-7x+12$.

$\frac{x^2}{x-3}-\frac{4}{x-4}=$ ____ + ____/____ $x^2-7x+12$

2. (1 pt) alfredLibrary/AUCI/chapter4/lesson1/quotient5pet.pg

If $f(x)=\frac{\sqrt{x}-7}{\sqrt{x}+7}$, then by the quotient rule,

$f'(x)=$ _____

3. (1 pt) alfredLibrary/AUCI/chapter4/lesson1/quotientapplication1pet.pg

A drug is injected into the bloodstream of a patient. The concentration (in milligrams per cubic centimeter) of the drug in the bloodstream t hours after the injection is given by

$$C(t)=\frac{0.16t}{t^2+6}.$$

(a) By the quotient rule, the rate of change of the drug concentration with respect to time after a half hour is

_____ mg per cubic cm per hr.

(b) How fast is the drug concentration changing after 3 hours?

_____ mg per cubic cm per hr

4. (1 pt) alfredLibrary/AUCI/chapter4/lesson1/quotientapplication2pet.p

The pressure on an object P in Pascals (Pa) is proportional to the temperature T in degrees Celsius (C) and inversely proportional to the volume V in cubic meters (m^3), where all three quantities depend on time t in seconds (s). That is,

$$P(t)=\frac{T(t)}{V(t)}$$

At time $t=8$ seconds, the temperature of the object is $66C$ and changing at a rate of $2\frac{C}{s}$. At this same time, the volume is $5m^3$ and changing at the rate $-1\frac{m^3}{s}$. By the quotient rule, the pressure on the object at $t=8$ seconds is changing at the rate of

$P'(8)=$ _____

units

5. (1 pt) alfredLibrary/AUCI/chapter4/lesson1/graphanalysis22pet.pg

Let $f(x)=\frac{x^2-(-13)x+42}{x^2+5x+6}$.

(a) The y-intercept is $y=$ _____

(b) The x-intercept(s) is/are $x=$ _____

(c) The vertical asymptote(s) is/are $x=$ _____

(d) To find the local extrema of f, we set $f'(x)=0$ and solve for x. In this case,

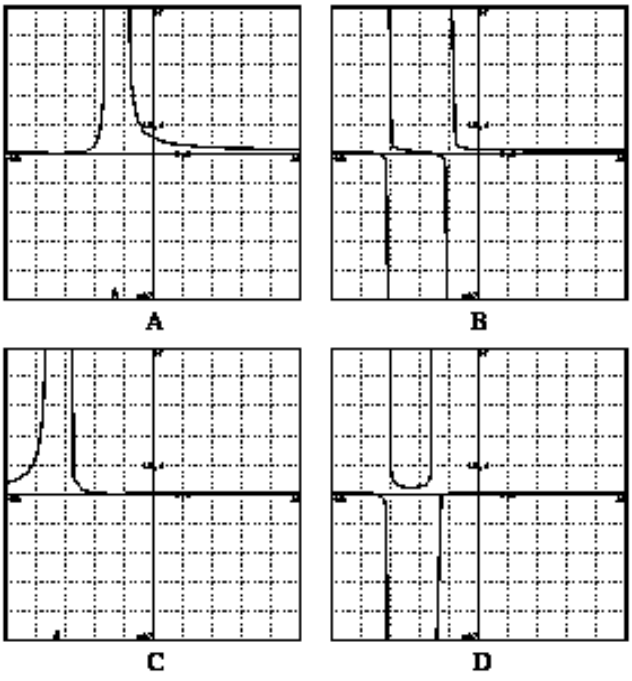
$f'(x)=$ _____,

and we must find the zeros of the numerator. In reduced form (expanded without parentheses), we must ultimately solve the equation

_____ $=0$.

Therefore, the local extrema are at $x=$ _____

(e) Use the information from parts (a)-(d) (and without a calculator!) to choose the correct graph of f. [?]



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