1. Question Details SCalc8 3.6.001. [3354053]

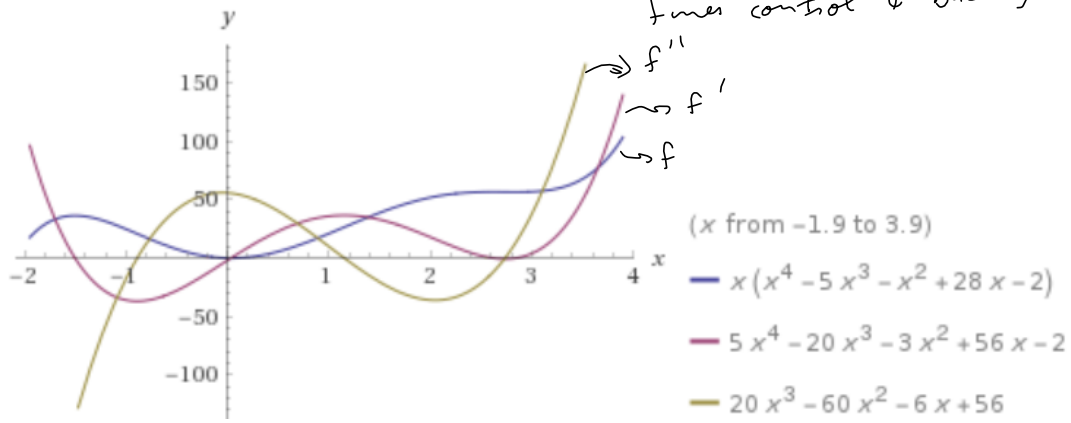
Produce graphs of f that reveal all the important aspects of the curve. Then use calculus to find the following. (Enter your answers using interval notation. Round your answers to two decimal places.)

$f(x) = x^5 - 5x^4 - x^3 + 28x^2 - 2x$

$\Rightarrow f'(x) = 5x^4 - 20x^3 - 3x^2 + 56x - 2$

$\Rightarrow f''(x) = 20x^3 - 60x^2 - 6x + 56$

Wolfram alpha .com can plot & take derivatives & solve equations. I'm going to use Maple, quite a bit, b/c I have finer control & bad eyes.



$f := x \to x^5 - 5 \cdot x^4 - x^3 + 28 \cdot x^2 - 2 \cdot x$

$x \to x^5 - 5x^4 - x^3 + 28x^2 - 2x$

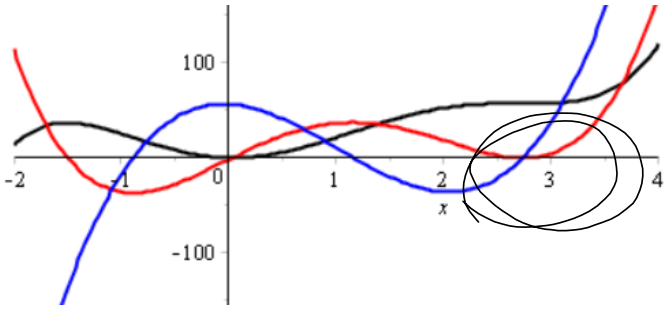
$fp := D(f)$

$x \to 5x^4 - 20x^3 - 3x^2 + 56x - 2$

$fpp := D(fp)$

$x \to 20x^3 - 60x^2 - 6x + 56$

$plot([f(x), fp(x), fpp(x)], x = -2..4, color = [black, red, blue], thickness = 2)$



$evalf(solve(f(x) = 0))$

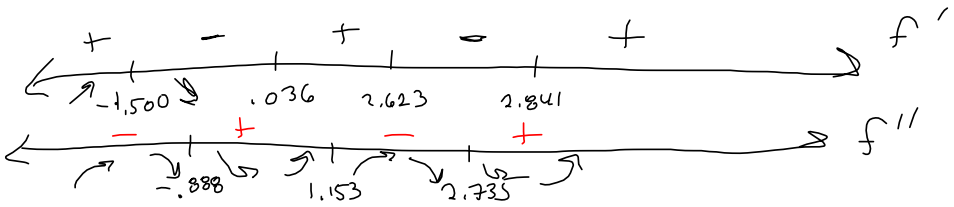
0., 0.07167687162, ~~3.510312867 + 1.006841751 I~~, -2.092302606, ~~3.510312867 - 1.006841751 I~~

$evalf(solve(fp(x) = 0))$

0.03579918077, 2.622735166, 2.841010876, -1.499545222

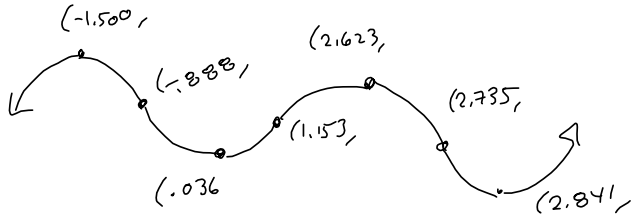
$evalf(solve(fpp(x) = 0))$

2.735481343 ~~- 3. 10^-10 I~~, -0.8880731574 ~~- 2.464101616 10^-10 I~~, 1.152591815 ~~+ 4.464101616 10^-10 I~~



$[fpp(-1), fpp(1), fpp(2), fpp(3)]$

$[-18, 10, -36, 38]$



Increasing:
$(-\infty, -1.500) \cup (.036, 2.623) \cup (2.841, \infty)$

Decreasing:
$(-1.500, .036) \cup (2.623, 2.841)$

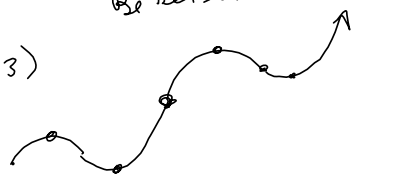
C-up: $(-.888, 1.153) \cup (2.735, \infty)$

C-down: $(-\infty, -1.500) \cup (1.153, 2.735)$

Local max: $\approx (-1.500, 36.469), (2.623, 56.833)$

Local min: $\approx (.036, -.036), (2.841, 56.734)$

Be then representation

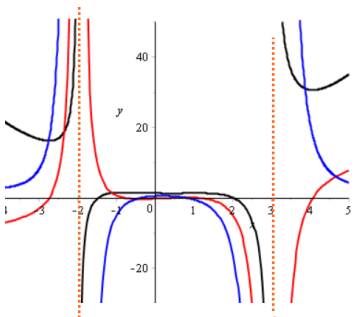


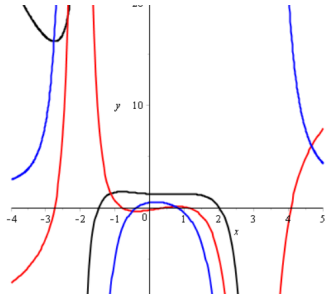
[36.46876421, -0.3576811693e-1, 56.83294597, 56.73405785]

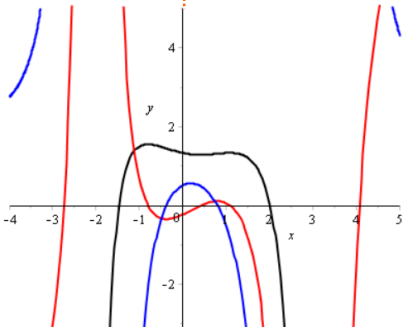
2. Question Details SCalc8 3.6.004. [3354046]

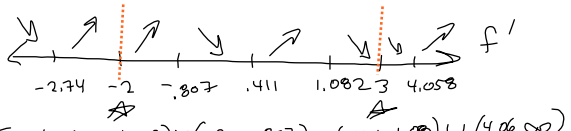
Produce graphs of f that reveal all the important aspects of the curve. Then use calculus to find the following. (Enter your answers using interval notation. Round your answers to two decimal places.)

$f(x) = \frac{x^4 - x^3 - 8}{x^2 - x - 6} = \frac{x^4 - x^3 - 8}{(x-3)(x+2)}$ O.A. is quadratic.



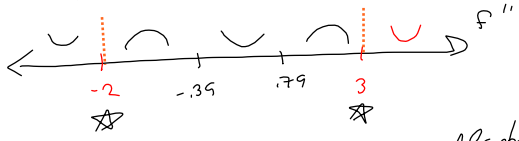






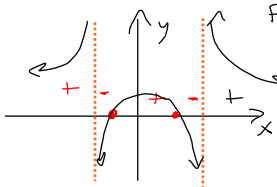
Inc: $(-2.74, -2) \cup (-2, -.807) \cup (.411, 1.08) \cup (4.06, \infty)$

Dec: $(-.81, .411) \cup (1.08, 3) \cup (3, 4.06)$



$f(x) = 0 \Rightarrow x \in \{2., -1.477967242\}$

$(x-2)(x+1.477\ldots)$ (other stuff)



From Algebra. Test $f(2.5)$, $f(1)$, $f(-1.75)$

$f'(x) = 0 \Rightarrow x \in \{.4110790456, 1.082024449, 4.058901063, -.8071908715, -2.744813686\}$

$[f(-2.744813686), f(-0.8071908715), f(0.4110790456), f(1.082024449), f(4.058901063)] \approx [16.22893418, 1.552334545, 1.288175337, 1.335773983, 30.63478192]$

MIN MAX MIN MAX MIN

$f''(x) = 0 \Rightarrow x \in \{.7903183252, -.3875863048\}$

$[f(-0.3875863048), f(0.7903183252)] \approx [1.449822832, 1.314284865]$

Oblique Asymptote by division

$quo(x^4 - x^3 - 8, x^2 - x - 6, x)$

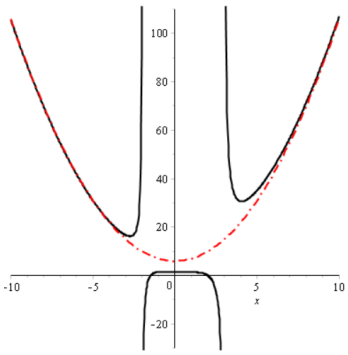
$f(x) = x^2 + 6 + \frac{6x + 28}{x^2 - x - 6}$

$x^2 + 6$

$\frac{27}{6} = 4 + \frac{3}{6}$

$rem(x^4 - x^3 - 8, x^2 - x - 6, x)$

$28 + 6x$



Showing the x^2+6 O.A. for $f(x)$.

Oct 24-9:55 AM

2. Question Details SCalc8 3.6.004. [3354046]

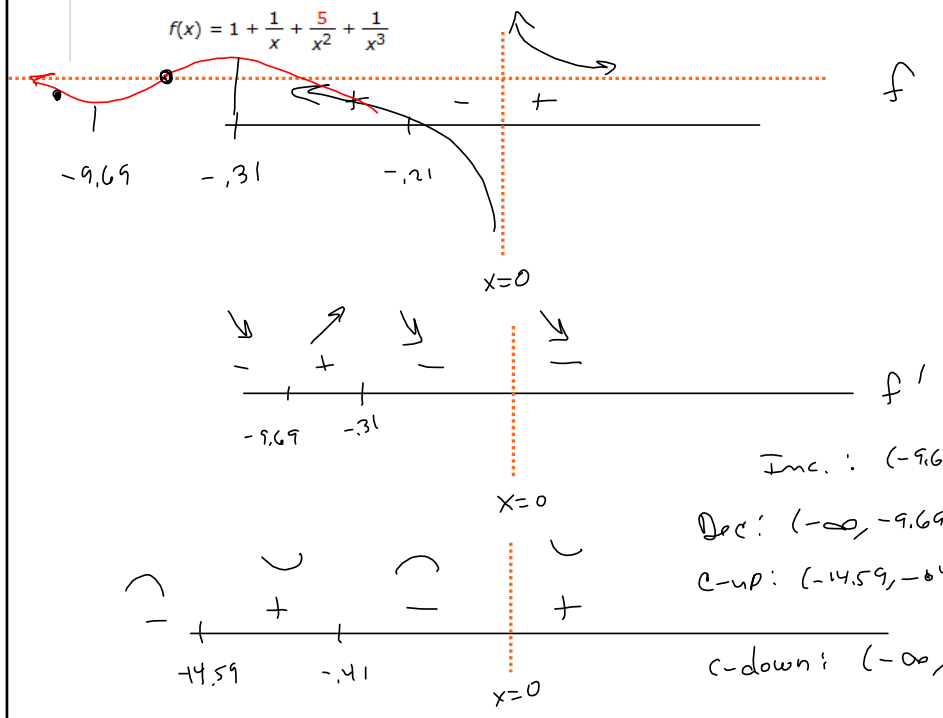
Produce graphs of f that reveal all the important aspects of the curve. Then use calculus to find the following. (Enter your answers using interval notation. Round your answers to two decimal places.)

$$f(x) = \frac{x^4 - x^3 - 8}{x^2 - x - 6}$$

3. Question Details SCalc8 3.6.009.MI. [3353743]

Produce graphs of f that reveal all the important aspects of the curve. Then use calculus to find the intervals of increase and decrease and the intervals of concavity. (Enter your answers in interval notation. Do not round your answers.)

$f(x) = 1 + \frac{1}{x} + \frac{5}{x^2} + \frac{1}{x^3}$



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4. Question Details SCalc8 3.6.011. [3353748]

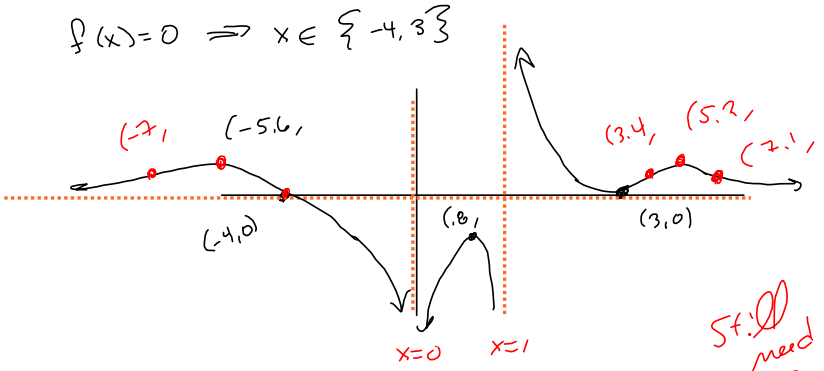
Sketch the graph by hand using asymptotes and intercepts, but not derivatives. Then use your sketch as a guide to producing graphs (with a graphing device) that display the major features of the curve. Use these graphs to estimate the maximum and minimum values. (Round your answers to three decimal places.)

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

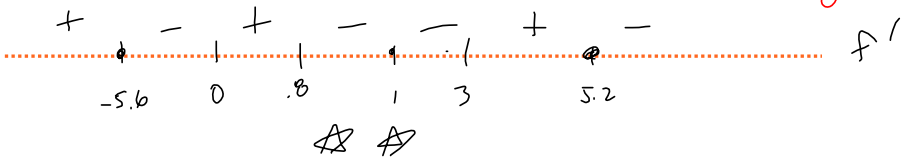
$\frac{x^3}{x^5}$ $x \to \infty$ $0 = y = H.A.$ Proper

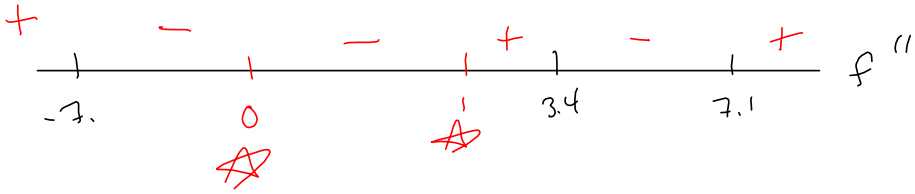
$D = \mathbb{R} \setminus \{0, 1\}$ $\Rightarrow$ $x=0$, $x=1$ are V.A.

$f(x) = 0 \Rightarrow x \in \{-4, 3\}$



Still need to fill in details.



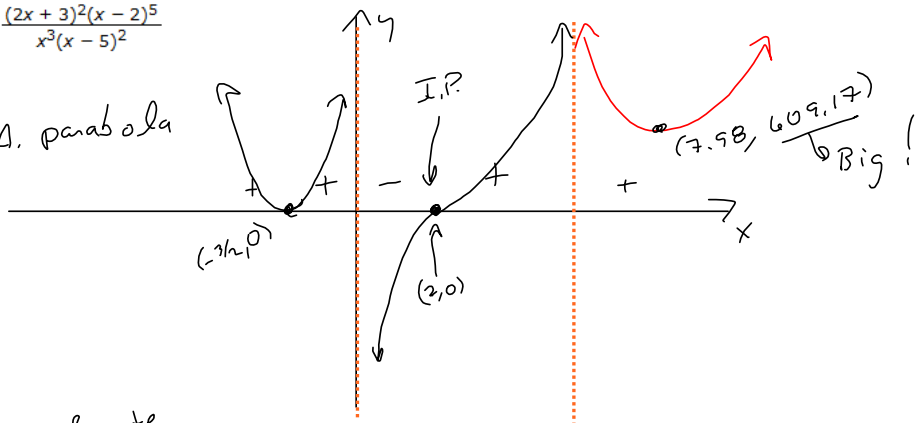


5. Question Details SCalc8 3.6.012. [3354026]

Sketch the graph by hand using asymptotes and intercepts, but not derivatives. Then use your sketch as a guide to producing graphs (with a graphing device) that display the major features of the curve. Use these graphs to estimate the maximum and minimum values. (Round your answers to three decimal places.)

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

$\frac{x^7}{x^5} = x^2 \Rightarrow$ O.A. parabola



4x

oblique asymptote

$$f(x) = 4x^2 + 12x + 69 + \frac{460x^4 - 2005x^3 + 112x^2 + 336x - 288}{x^3(x-5)^2}$$

See Maple for the O.A.

6. Question Details SCalc8 3.6.015. [3353652]

Use a computer algebra system to graph f and to find f' and f''. Use graphs of these derivatives to find the following. (Enter your answers using interval notation. Round your answers to two decimal places.)

$$f(x) = \frac{x^3 + 5x^2 + 1}{x^4 + x^3 - x^2 + 2}$$

The intervals where the function is increasing.

7. Question Details SCalc8 3.6.016. [3354002]

Use a computer algebra system to graph f and to find f' and f''. Use graphs of these derivatives to find the following. (Ente your answers using interval notation. Round your answers to two decimal places.)

$$f(x) = \frac{x^{2/3}}{6 + x + x^4}$$

Oct 24-7:59 AM

8. Question Details SCalc8 3.6.017. [335399

Use a computer algebra system to graph f and to find f' and f''. Use graphs of these derivatives to find the following.

$f(x) = \sqrt{x + 5\sin(x)} \quad x \leq 20$

9. Question Details SCalc8 3.6.020. [3354063]

Describe how the graph of f varies as c varies. On your own, graph several members of the family to illustrate the trends that you discover. In particular, you should investigate how maximum and minimum points and inflection points move when c changes. You should also identify any transitional values of c at which the basic shape of the curve changes.

$f(x) = x^3 + cx$

10. Question Details SCalc8 3.6.502.XP. [3389921]

Find a positive number such that the sum of the number and its reciprocal is as small as possible.

Oct 24-8:03 AM