Review Sheet for Test #3

Compute the difference quotient for the functions.

1) $f(x) = 4x^2 - 7x + 15$

2) $h(x) = 2x^2 - 5x - 11$

Find all roots of the function algebraically in simplest radical form. Then find the relative max/min to the nearest thousandth.

3) $f(x) = 2x^3 + 16x^2 + 33x + 15$

4) $g(x) = 3x^3 - 23x^2 + 12x + 14$

Solve the inequality and express your answer in interval notation.

5) $\frac{x+10}{x-15} \geq 0$

6) $\frac{3x-5}{25x-17} < 0$

Find the product/quotient and write the result in standard complex form.

7) $\frac{32(cos(255)+isin(255))}{8(cos(15)+isin(15))}$

8) $11(cos(176°) + isin(176°)) * 9(cos(154°) + isin(154°))$

Find the inverse for the function.

9) $f(x) = \frac{8}{x+10}$

10) $y = \frac{x+2}{x-9}$

Find the magnitude and direction angle for the given vector.

11) $v = \langle -4, -4\sqrt{3} \rangle$

12) $u = \langle 13, -13 \rangle$

Find all exact solutions in radians.

13) $cos^2(x) - cos(x) = 0$

14) $tan^2(x) - \sqrt{3}tan(x) = 0$

Let $u = Ln(x)\ and\ v = Ln(y)$. Express in terms of u, and v.

15) $Ln\left(\sqrt{x^7 \sqrt[13]{y}}\right)$

16) $Ln\left(\frac{\sqrt{y^9}}{x^{19}}\right)$

Find the domain, asymptotes, and x-intercepts of the function, and then sketch its graph.

17) $f(x) = -Log(x-2)$

18) $f(x) = Ln(14 - 2x)$

19) The initial population of a village is 65 thousand and growing at a rate of 5.8% per year. Round your answers to the nearest tenth.
   a) What will the population of the village be after 7 years?
   b) In how many years will the population double?

State the amplitude, period and phase shift. Then sketch one complete cycle of the graph, labeling all maximums, minimums, and x-intercepts.

20) $f(x) = -7cos(5x - \pi)$

21) $g(x) = 2sin\left(3x + \frac{\pi}{2}\right)$

22) Analyze the rational function $f(x) = \frac{6x+15}{3x+11}$ algebraically to determine:
   a) Domain b) Vertical Asymptotes c) Horizontal Asymptotes
   d) x and y intercepts e) Sketch the complete graph in the proper window

Answers

1) $8x + 4h - 7$

2) $4x - 5 + 2h$

3) $x = -5, \frac{-3 \pm \sqrt{3}}{2}$ Max: (-3.936, 11.032) Min: (-1.397, -5.328)

4) $x = 7, \frac{1 \pm \sqrt{7}}{3}$ Max: (.276, 15.623) Min: (4.835, -126.570)

5) $(-\infty, -10] U (15, \infty)$

6) $\left(\frac{17}{25}, \frac{5}{3}\right)$

7) $-2 - 2i\sqrt{3}$

8) $\frac{99\sqrt{3}}{2} - \frac{99i}{2}$

9) $f^{-1}(x) = \frac{8-10x}{x}$

10) $f^{-1}(x) = \frac{9x+2}{x-1}$

11) $\|v\| = 8, \theta = 240°$

12) $\|u\| = \sqrt{338}, \theta = 315°$

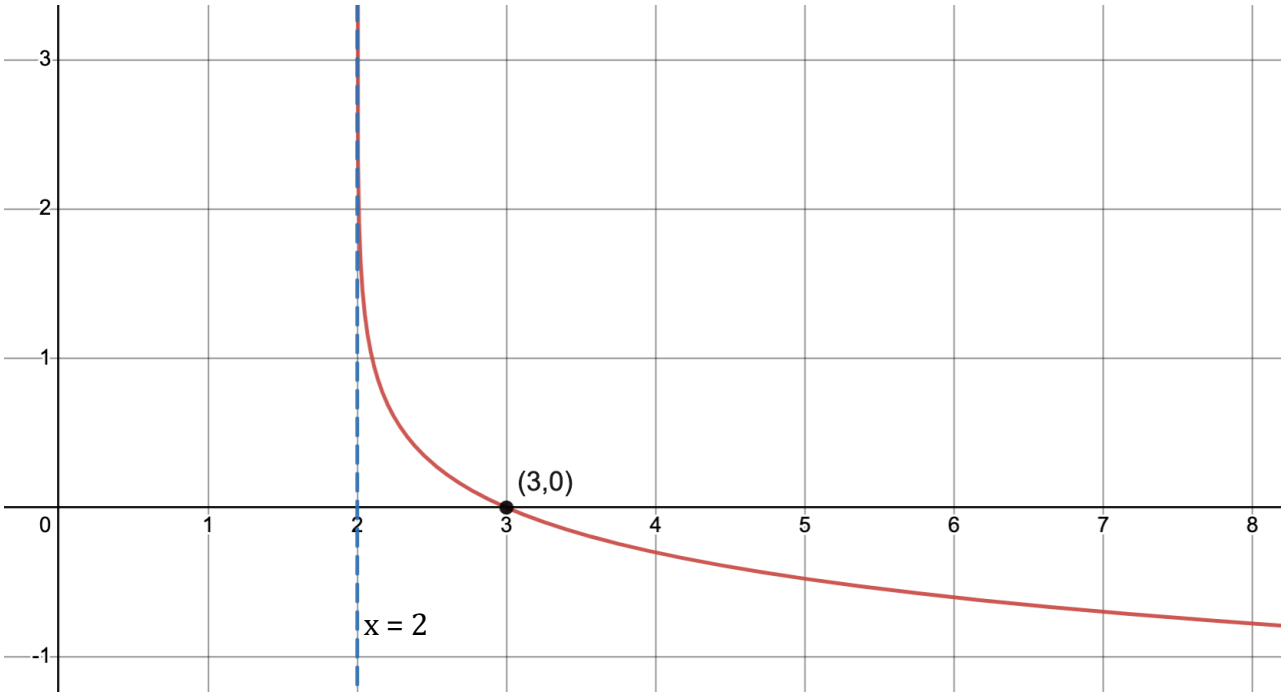
13) $\pi + 2\pi n, \frac{3\pi}{2} + 2\pi n, 0 + 2\pi n$

14) $0 + 2\pi n, \pi + 2\pi n, \frac{\pi}{3} + 2\pi n, \frac{4\pi}{3} + 2\pi n$

15) $\frac{7}{2}u + \frac{1}{26}v$

16) $\frac{9}{2}v - 19u$

17) D: $(2, \infty)$, VA: x = 2, x-int: (3, 0)



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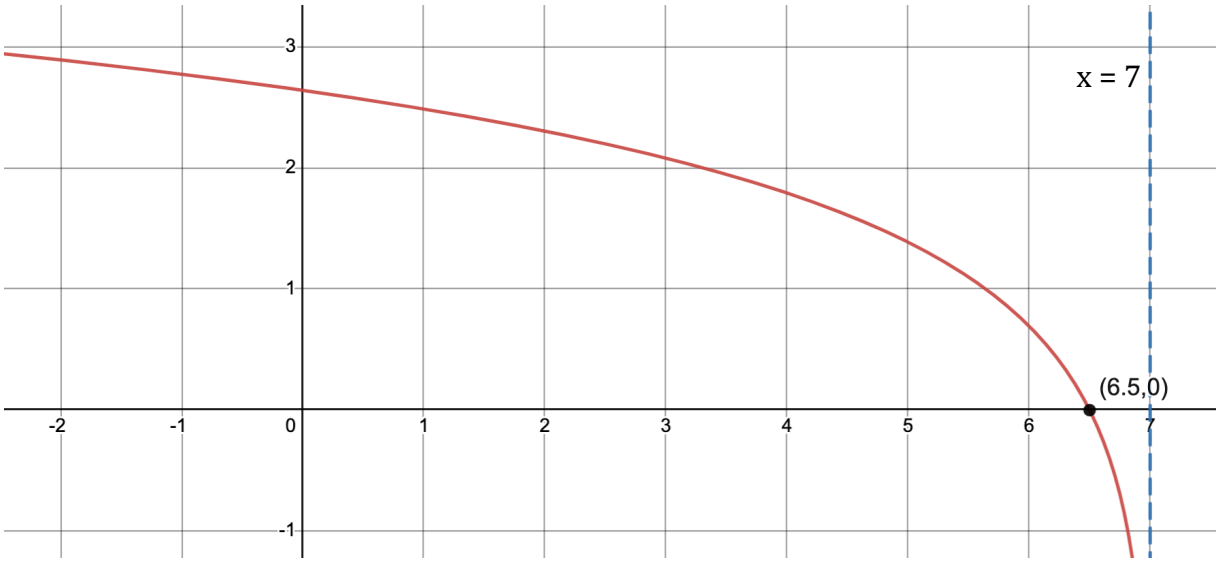
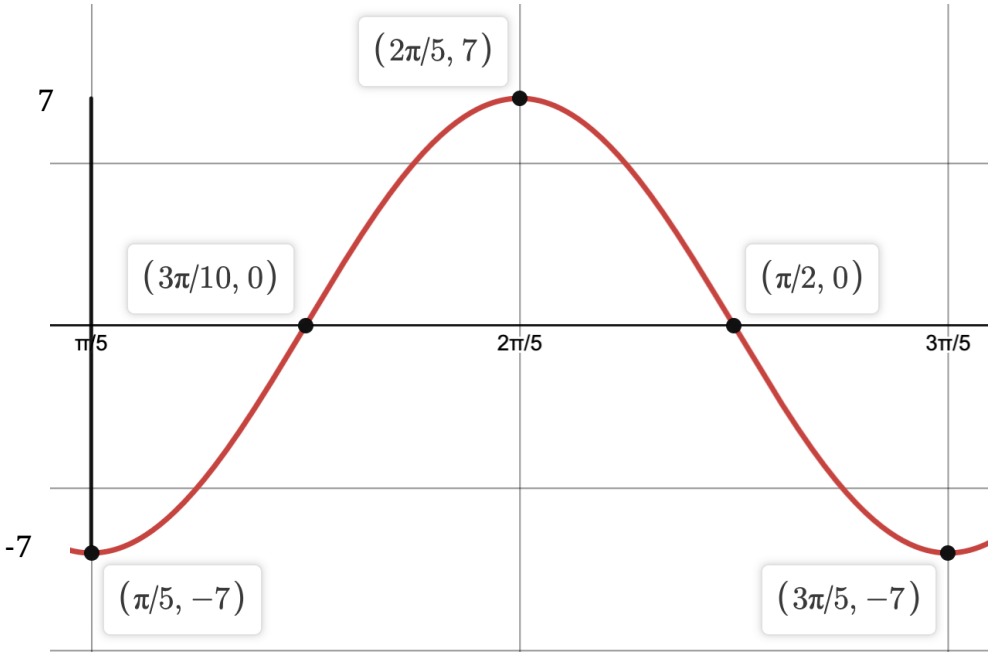
18) D: $(-\infty, 7)$, VA: x = 7, x-int: (6.5,0)



19) a) 96.5 thousand b) 12.3 years

20) Amp: 7, Pd: $\frac{2\pi}{5}$, PS: $\frac{\pi}{5}$ From the start, each $\frac{1}{4}$ period moves $+\frac{\pi}{10}$ units



Min: $\left(\frac{\pi}{5}, -7\right), \left(\frac{3\pi}{5}, -7\right)$ Max: $\left(\frac{2\pi}{5}, 7\right)$ x-int: $\left(\frac{3\pi}{10}, 0\right), \left(\frac{\pi}{2}, 0\right)$

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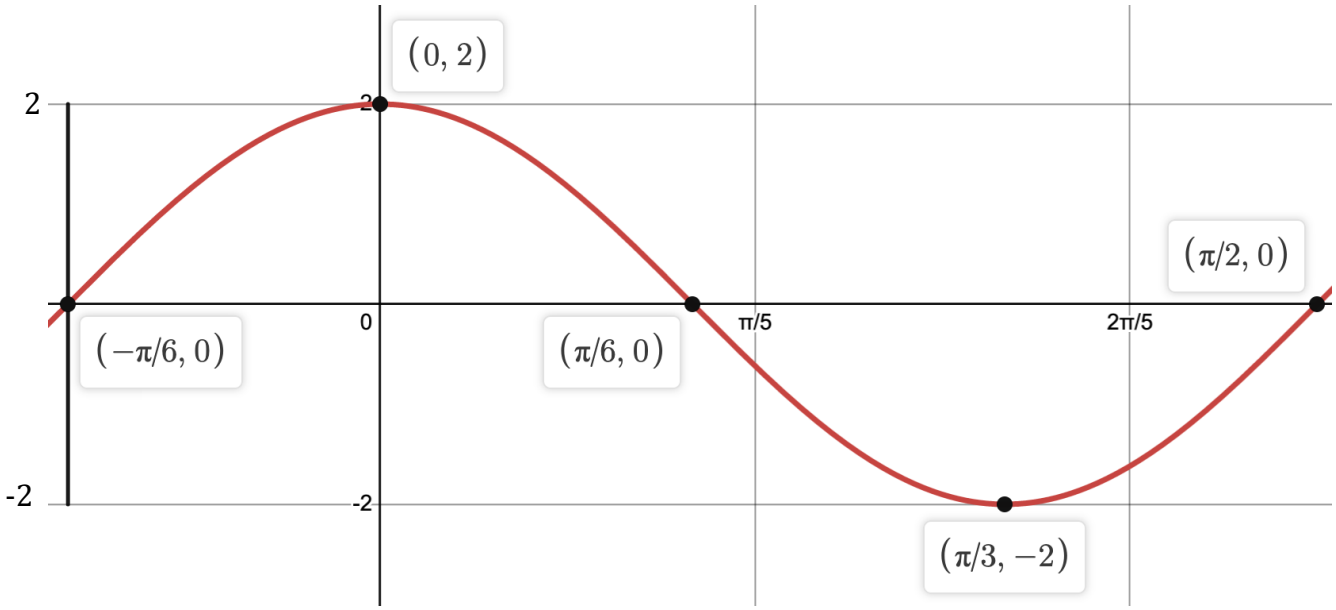
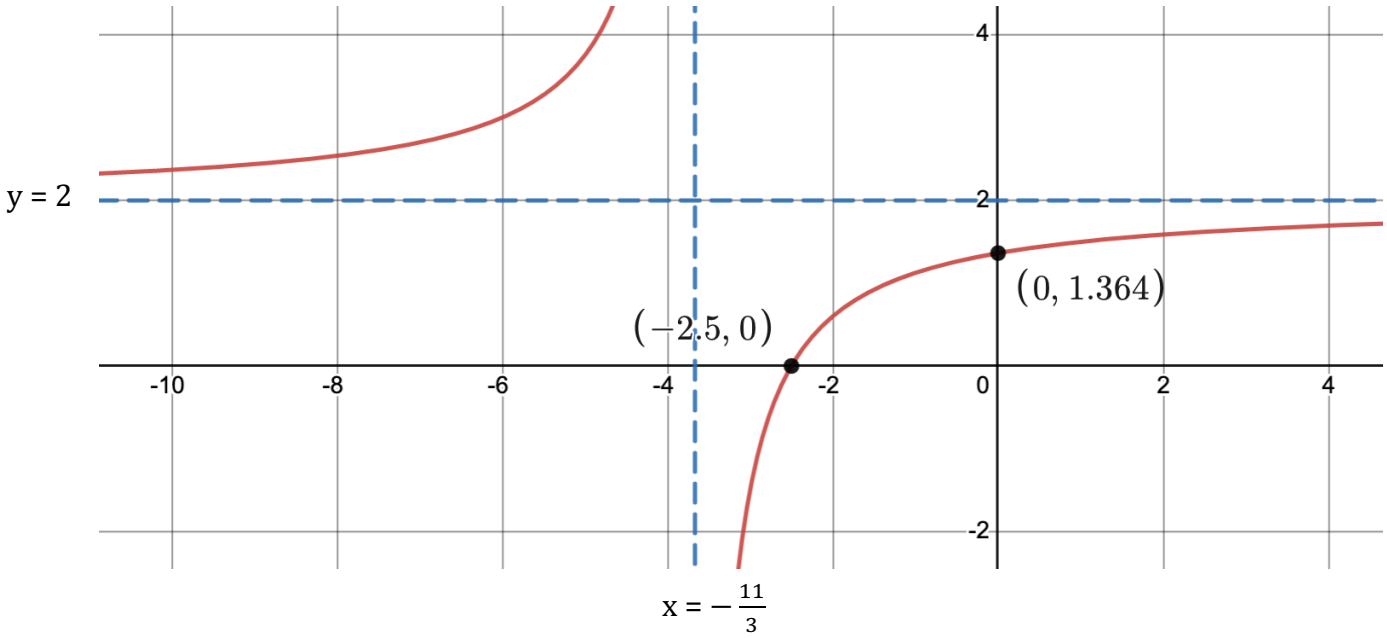
21) Amp: 2, Pd: $\frac{2\pi}{3}$, PS: - $\frac{\pi}{6}$ From the start, each $\frac{1}{4}$ period moves $+\frac{\pi}{6}$ units



Min: $\left(\frac{\pi}{3}, -2\right)$ Max: (0,2) x-int: $\left(-\frac{\pi}{6}, 0\right), \left(\frac{\pi}{6}, 0\right), \left(\frac{\pi}{2}, 0\right)$

22) a) $\left(-\infty, -\frac{11}{3}\right) U \left(\frac{11}{3}, \infty\right)$ b) $x = -\frac{11}{3}$ c) y = 2 d) x-int: $\left(-\frac{5}{2}, 0\right)$ y-int: $\left(0, \frac{15}{11}\right)$



x = $-\frac{11}{3}$

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