

Name:

Pre-Calculus

Date:

Practice Test #1

1) Solve $6x^{\frac{1}{2}} - 5x^{\frac{1}{4}} = 6$

- 2) Graph, determine if the graph is a function and, if it is, rewrite the relation using function notation, find all relative maxima and minima, determine the domain and range, and identify the intervals where the graph is increasing or decreasing for the following piecewise relation

$$y = \begin{cases} |x+4| - 5 & \text{for } x \leq -2 \\ 2x - 7 & \text{for } -2 < x \leq 3 \\ -x^2 + 10x - 19 & \text{for } x > 3 \end{cases}$$

- 3) Solve the inequality $\frac{3}{x^2 - x - 6} \leq \frac{2}{x^2 - 3x}$ and graph your final answer on a number line.

- 4) Find $(f + g)(x)$, $(f \cdot g)(x)$, and $(g \circ f)(x)$ if $g(x) = -2x^2 + 4x - 3$ and $f(x) = -5x + 7$, evaluate $(g / f)(-2m)$, and then construct and simplify $\frac{g(x-k) + g(x)}{k}$

- 5) Lydia wants to build a fence around part of his backyard so that his goat can go outside without running away. Ellie has 520 feet of fence available to build this rectangular enclosure. Use completing the square to determine the dimensions (length and width) of the enclosure in order to maximize the area AND determine how much area this new fence provides for her goat.

- 6) Find the equations for all of the vertical, horizontal, and oblique asymptotes for the function $f(x) = \frac{-3x^5 + 2x^4 - 7x^3 - 9x^2 + 4x - 5}{x^4 + 6x^3 - 9x^2 - 54x}$

- 7) If the half-life of carbon-14 is 5730 years, how old is a bone that has lost 5% of its carbon-14? (round your answer to the nearest whole number)

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- 8) Aidan invests \$93,801 in an account that earns 4.2% interest compounded continuously. If, when he closes the account, the bank gives her \$131,259.40, how many years did Aidan keep the money in the bank? (round your answer to the nearest whole number) If he had invested the same amount for the same amount of time and same interest rate but compounded monthly, how much less money would he end up with compared to the continuous compounding?
- 9) Graph the equation $y = x^2$ and then use this graph to determine whether it is symmetric to the x axis, y axis, and/or the origin AND determine if it is even, odd, or neither even nor odd. Write an equation for a function that has a graph with the shape of $y = x^2$ but is shifted 5 units down, shifted 9 units to the right, is “skinnier” by a factor of 4, and is upside down.
- 10) Use Descartes’ rule of signs to determine the nature of the roots, then list all of the possible rational zeros, find all of the rational, irrational, or imaginary zeros if $f(x) = 0$, factor $f(x)$, and then use this information, along with your knowledge of end behavior, to make an approximate graph for the function if $f(x) = 2x^5 + 8x^4 - 12x^3 - 68x^2 - 14x + 84$

Extra Credit

- 11) 11) Solve: $\sqrt{2x-8} - \sqrt{x} = 2$

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Answer Key - Practice Test #1

1) $x = \frac{81}{16}$

2)

The relation is a function.

$$f(x) = \begin{cases} |x+4| - 5 & \text{for } x \leq -2 \\ 2x - 7 & \text{for } -2 < x \leq -3 \\ -x^2 + 10x - 19 & \text{for } x > -3 \end{cases}$$

Relative Minima: (5, 6)

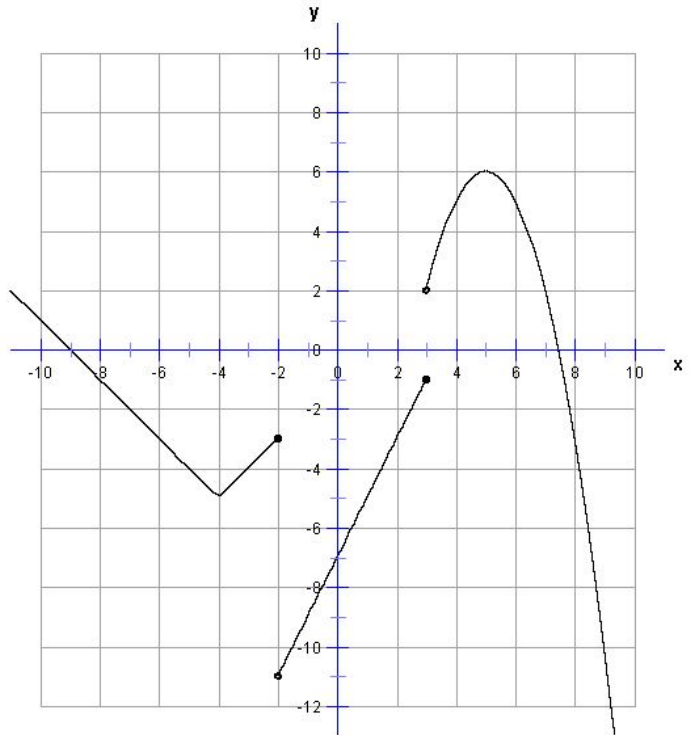
Relative Maxima: (-4, -5)

Domain: All Real Numbers or \mathbb{R}

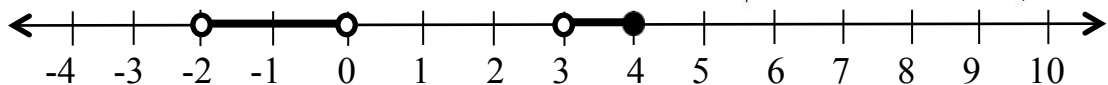
Range: All Real Numbers or \mathbb{R}

Increasing: $-4 < x < 5$

Decreasing: $x < -4$ and $x > 5$



3) $4 \geq x > 3$ or $-2 < x < 0$



4) $(f + g)(x) = -2x^2 - x + 4$

$(f \cdot g)(x) = 10x^3 - 34x^2 + 43x - 21$

$(g \circ f)(x) = -50x^2 + 120x - 73$

$(g / f)(-2m) = \frac{-8m^2 - 8m - 3}{10m + 7}$

$$\frac{g(x-k) + g(x)}{k} = \frac{-4x^2}{k} + 4x + \frac{8x}{k} - 2k - 4 - \frac{6}{k}$$

5) $A = -x^2 + 260x$ $A = -(x-130)^2 + 16,900$ 130 ft wide, 130 ft long, $A = 16,900 \text{ ft}^2$

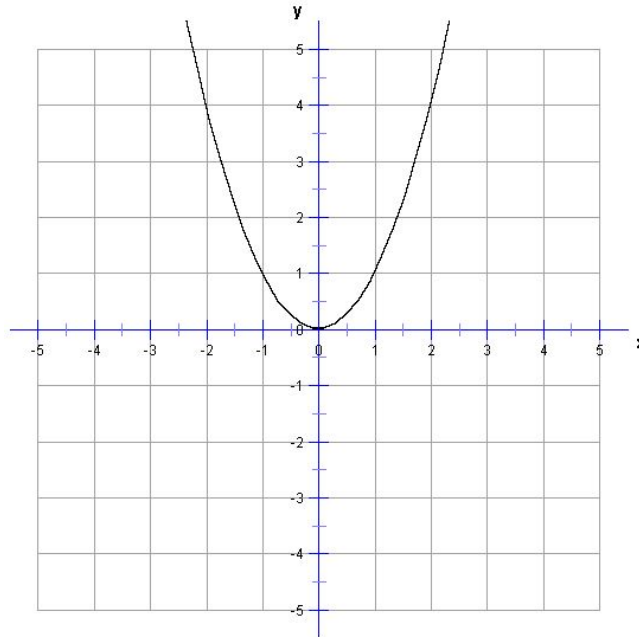
6) oblique asymptote: $y = -3x + 20$ vertical asymptotes: $x = 3, x = -3, x = -6, x = 0$

7) 424 years old

8) 8 years \$76.98

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Answer Key - Practice Test #1

9) Symmetric to the y axis and it is even. $y = -4(x-9)^2 - 5$

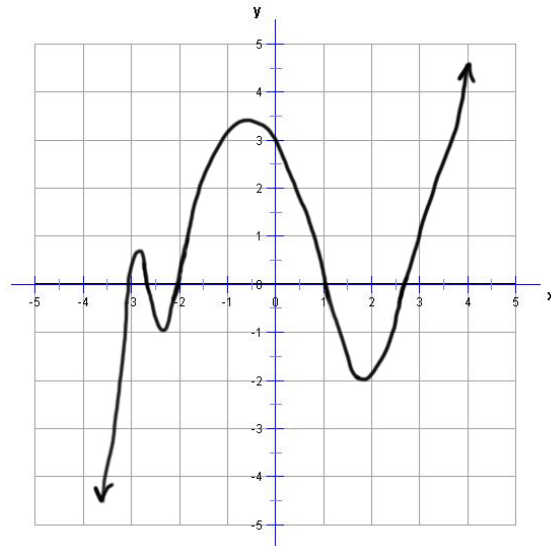


10)

Positive Real Roots	Negative Real Roots	Imaginary Roots
2	3	0
0	3	2
2	1	2
0	1	4

$$\pm 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84, \frac{1}{2}, \frac{3}{2}, \frac{7}{2}, \frac{21}{2}$$

$$\text{zeros} = -3, 1, -2, \sqrt{7}, -\sqrt{7} \quad f(x) = 2(x+3)(x-1)(x+2)(x-\sqrt{7})(x+\sqrt{7})$$



****Extra Credit****

11) $x = 36$