

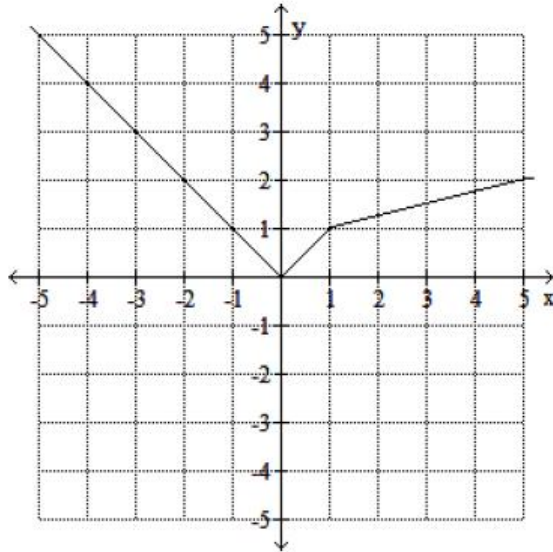
Precalculus Final Exam Review ... Set 1

Evaluate the function at the given value of the independent variable and simplify.

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

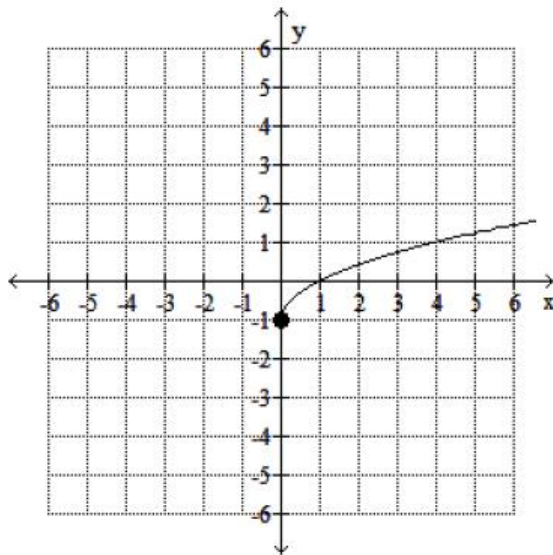
Use the graph to find the indicated function value.

2) $y = f(x)$. Find $f(-2)$



Use the graph to determine the function's domain and range.

3)



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Answers

1) $x^2 - 8x + 11$

2) 2

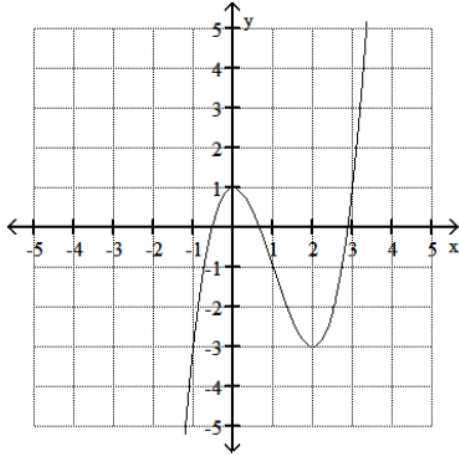
3) domain: $[0, \infty)$

range: $[-1, \infty)$

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Use the graph of the given function to find any relative maxima and relative minima.
State where $f(x)$ increases and decreases

4) $f(x) = x^3 - 3x^2 + 1$



Find and simplify the difference quotient $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$ for the given function.

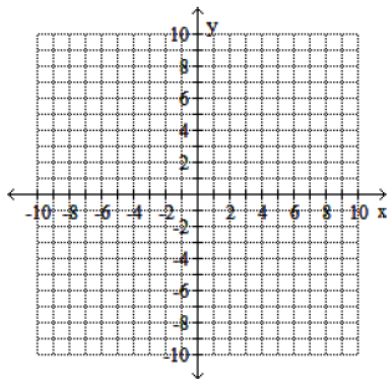
5) $f(x) = x^2 + 7x + 3$

Use the given conditions to write an equation for the line in slope-intercept form.

6) Passing through $(2, 5)$ and $(1, 8)$

Begin by graphing the standard quadratic function $f(x) = x^2$. Then use transformations of this graph to graph the given function.

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



For the given functions f and g , find the indicated composition.

8) $f(x) = \frac{7}{x+4}$, $g(x) = \frac{4}{5x}$

$(f \circ g)(x)$

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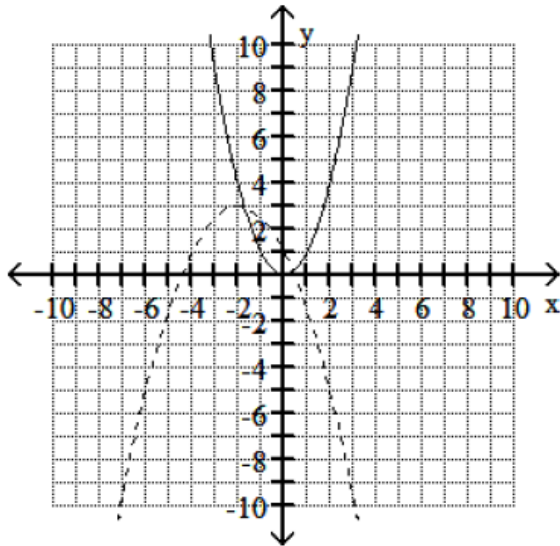
Answers

4) maximum: (0, 1); minimum: (2, -3)

5) $2x + h + 7$

6) $y = -3x + 11$

7)



8) $\frac{35x}{4 + 20x}$

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Find the inverse of the one-to-one function.

$$9) f(x) = \frac{3}{2x + 1}$$

Complete the square and write the equation in standard form.

Then give the center and radius of the circle.

$$10) x^2 - 10x + 25 + y^2 - 8y + 16 = 64$$

Find the product and write the result in standard form.

$$11) (8 - 3i)(-2 - 3i)$$

Divide and express the result in standard form.

$$12) \frac{5}{8 - i}$$

Solve the quadratic equation using the quadratic formula.

Express the solution in standard form.

$$13) 4x^2 - 3x + 1 = 0$$

Find the coordinates of the vertex for the parabola defined by the given quadratic function.

$$14) f(x) = 5x^2 + 10x - 5$$

Solve the problem.

15) The cost in millions of dollars for a company to manufacture x thousand automobiles is given by the function $C(x) = 5x^2 - 20x + 36$.

Find the number of automobiles that must be produced to minimize the cost.

Find the zeros of the polynomial function.

$$16) f(x) = x^3 + 4x^2 - 4x - 16$$

Divide using long division or synthetic division

$$17) \frac{3m^3 + 18m^2 - 74m + 63}{m + 9}$$

Find a rational zero of the polynomial function and use it to find all the zeros of the function.

$$18) f(x) = x^3 - 8x^2 + 19x - 14$$

Find the domain of the rational function.

$$19) h(x) = \frac{x + 2}{x^2 - 49x}$$

Find the vertical asymptotes, if any, of the graph of the rational function.

$$20) \frac{x - 64}{x^2 - 15x + 54}$$

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Answers

$$9) f^{-1}(x) = \frac{3}{2x} - \frac{1}{2}$$

$$10) (x - 5)^2 + (y - 4)^2 = 64$$

$(5, 4), r = 8$

$$11) -25 - 18i$$

$$12) \frac{8}{13} + \frac{1}{13}i$$

$$13) \left\{ \frac{3}{8} \pm i \frac{\sqrt{7}}{8} \right\}$$

$$14) (-1, -10)$$

15) 2 thousand automobiles

$$16) x = -4, x = -2, x = 2$$

$$17) 3m^2 - 9m + 7$$

$$18) \{2, 3 + \sqrt{2}, 3 - \sqrt{2}\}$$

$$19) \{x \mid x \neq 0, x \neq 49\}$$

$$20) x = 9, x = 6$$

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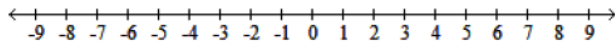
Find the horizontal asymptote, if any, of the graph of the rational function.

$$21) g(x) = \frac{8x^2}{2x^2 + 1}$$

Solve the polynomial inequality and graph the solution set on a number line.

Express the solution set in interval notation.

$$22) x^2 + 3x - 4 > 0$$



Solve the exponential equation. Express the solution set in terms of natural logarithms.

$$23) e^{2x} = 7$$

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$24) 5^{x+7} = 8$$

Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$25) \log_5(x+2) = -3$$

$$26) 2 \ln(7x) = 18$$

Solve the problem.

27) The formula $A = 238e^{0.032t}$ models the population of a particular city, in thousands, t years after 1998.

When will the population of the city reach 317 thousand?

Find the exact value of the expression.

$$28) \sin \frac{-2\pi}{3}$$

$$29) \sec \frac{-5\pi}{4}$$

Find the exact value of the expression.

$$30) \sin^{-1} \frac{\sqrt{2}}{2}$$

Find the exact value of the expression.

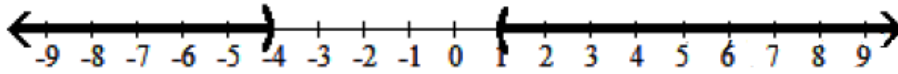
$$31) \cos \left(\sin^{-1} \frac{4}{5} \right)$$

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Answers

21) $y = 4$

22) $(-\infty, -4) \cup (1, \infty)$



23) $\left\{ \frac{\ln 7}{2} \right\}$

24) -5.71

25) $\left\{ -\frac{249}{125} \right\}$

26) $\left\{ \frac{e^9}{7} \right\}$

27) 2007

28) $-\frac{\sqrt{3}}{2}$

29) $-\sqrt{2}$

30) $\frac{\pi}{4}$

31) $\frac{3}{5}$

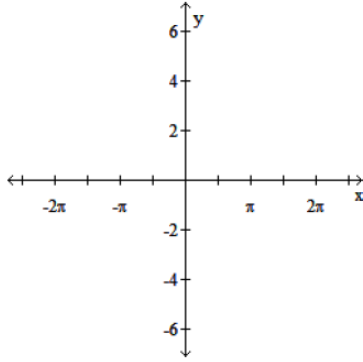
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Use a right triangle to write the expression as an algebraic expression. Assume that x is positive and in the domain of the given inverse trigonometric function.

32) $\sin(\tan^{-1} x)$

Use a transformations to graph the function.

33) $y = 2 \cos \frac{1}{2}x + 2$



Use the given information to find the exact value of the expression.

34) $\sin \theta = \frac{15}{17}$, θ lies in quadrant I Find $\cos 2\theta$.

Find all solutions of the equation.

35) $2 \cos x - 1 = 0$

Solve the equation on the interval $[0, 2\pi)$.

36) $\cos x + 2 \cos x \sin x = 0$

Solve the equation on the interval $[0, 2\pi)$.

37) $2 \cos^2 x + \sin x - 2 = 0$

Polar coordinates of a point are given. Find the rectangular coordinates of the point.

38) $(-7, 120^\circ)$

The rectangular coordinates of a point are given.

Find polar coordinates of the point. Express θ in radians.

39) $(5\sqrt{3}, 5)$

Write the partial fraction decomposition of the rational expression.

40) $\frac{7x + 31}{x^2 + 8x + 15}$

Solve the problem.

41) A vendor sells hot dogs and bags of potato chips.

A customer buys 5 hot dogs and 4 bags of potato chips for \$15.50.

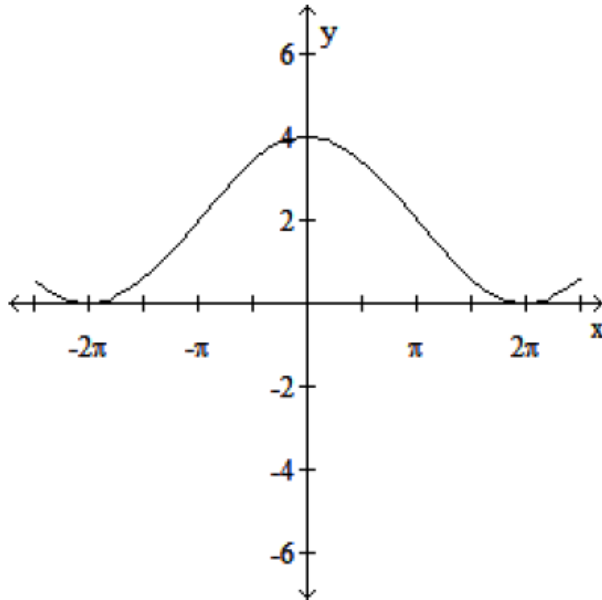
Another customer buys 2 hot dogs and 5 bags of potato chips for \$8.75. Find the cost of each item.

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Answers

$$32) \frac{x\sqrt{x^2 + 1}}{x^2 + 1}$$

33)



$$34) -\frac{161}{289}$$

$$35) x = \frac{\pi}{3} + 2n\pi \text{ or } x = \frac{5\pi}{3} + 2n\pi$$

41) \$2.50 for a hot dog; \$0.75
for a bag of potato chips

$$36) \frac{\pi}{2}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$$

$$37) 0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$$

$$38) \left\{ \frac{7}{2}, \frac{-7\sqrt{3}}{2} \right\}$$

$$39) \left\{ 10, \frac{\pi}{6} \right\}$$

$$40) \frac{2}{x+5} + \frac{5}{x+3}$$

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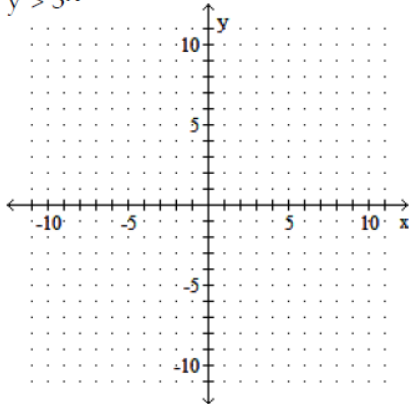
Solve the system

$$\begin{aligned} 42) \quad x - 2y &= 3 \\ x^2 - xy &= 20 \end{aligned}$$

Graph the solution set of the system of inequalities or indicate that the system has no solution.

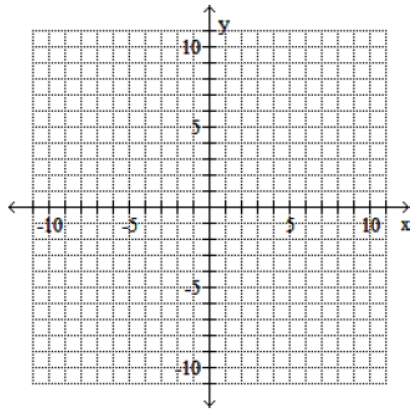
$$43) \quad x^2 + y^2 \leq 25$$

$$y > 3^x$$



Graph the ellipse and locate the foci.

$$44) \quad \frac{x^2}{49} + \frac{y^2}{16} = 1$$



Find the standard form of the equation of the ellipse satisfying the given conditions.

$$45) \quad \text{Foci: } (0, -4), (0, 4); \text{ vertices: } (0, -5), (0, 5)$$

Find the vertices and locate the foci for the hyperbola whose equation is given.

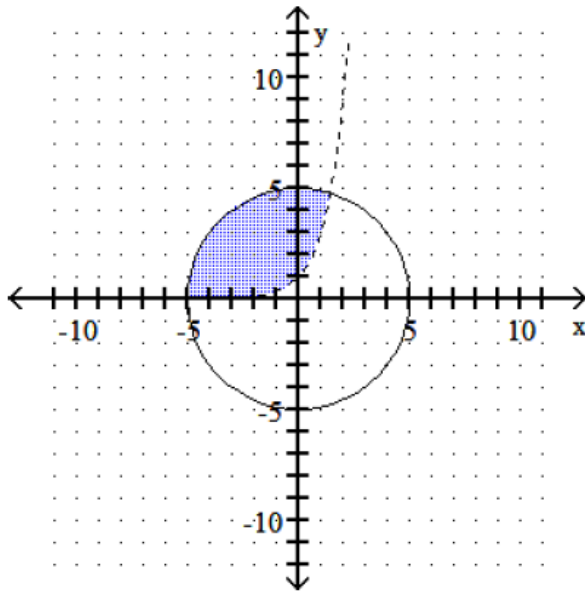
$$46) \quad \frac{y^2}{25} - \frac{x^2}{49} = 1$$

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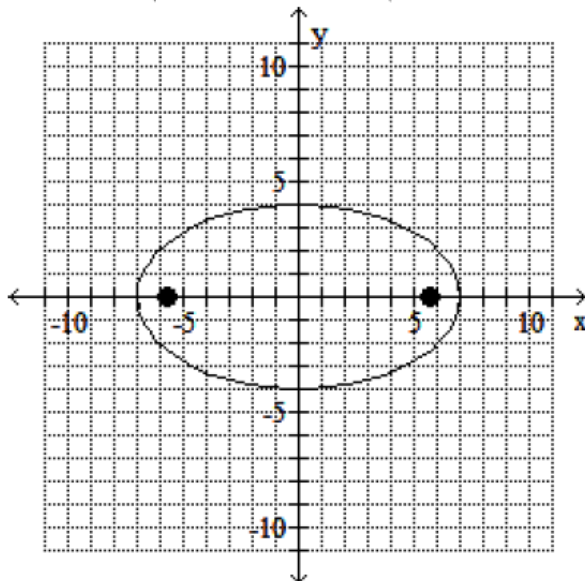
Answers

42) $\{(5, 1), (-8, -\frac{11}{2})\}$

43)



44) foci at $(\sqrt{33}, 0)$ and $(-\sqrt{33}, 0)$



45) $\frac{x^2}{9} + \frac{y^2}{25} = 1$

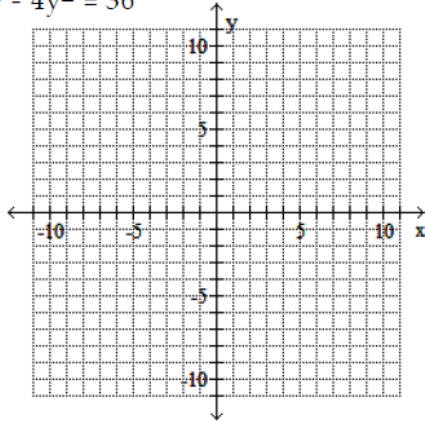
46) vertices: $(0, -5), (0, 5)$
foci: $(0, -\sqrt{74}), (0, \sqrt{74})$

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Use vertices and asymptotes to graph the hyperbola.

Find the equations of the asymptotes.

$$47) 9x^2 - 4y^2 = 36$$



Find the vertex, focus, and directrix of the parabola with the given equation.

$$48) (y + 2)^2 = 16(x + 1)$$

Convert the equation to the standard form for a parabola by completing the square on x or y as appropriate.

$$49) x^2 - 6x - 6y - 21 = 0$$

Find the indicated sum.

$$50) \sum_{i=3}^6 8i$$

Express the sum using summation notation. Use a lower limit of summation not necessarily 1 and k for the index of summation.

$$51) 9 + 11 + 13 + 15 + \dots + 25$$

Write a formula for the general term (the n th term) of the geometric sequence.

$$52) 8, 16, 32, 64, 128, \dots$$

Solve the problem.

53) A theater has 38 rows with 25 seats in the first row, 29 in the second row, 33 in the third row, and so forth. How many seats are in the theater?

Find the sum of the infinite geometric series, if it exists.

$$54) 5 + \frac{5}{2} + \frac{5}{4} + \frac{5}{8} + \dots$$

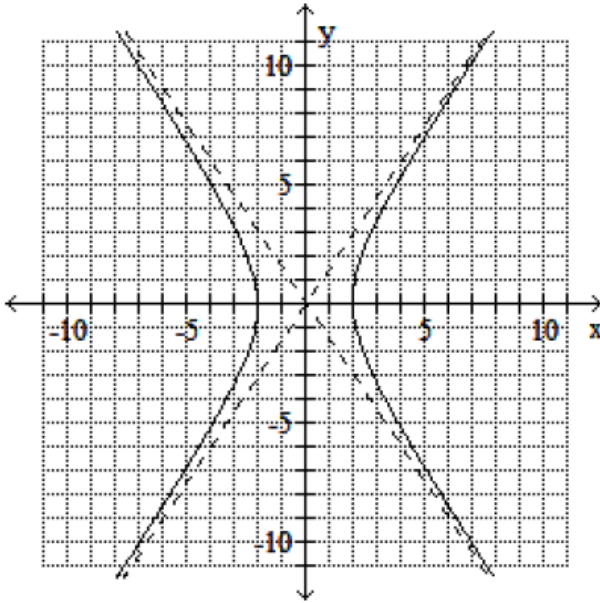
Write the first three terms in the binomial expansion, expressing the result in simplified form.

$$55) (x + 2)^{20}$$

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Answers

47) Asymptotes: $y = \pm \frac{3}{2}x$



48) vertex: $(-1, -2)$

focus: $(3, -2)$

directrix: $x = -5$

49) $(x - 3)^2 = 6(y + 5)$

50) 144

51) $\sum_{k=2}^{10} 2k + 5$

52) $a_n = 8(2)^{n-1}$

53) 3762 seats

54) 10

55) $x^{20} + 40x^{19} + 760x^{18}$