

Test

Name: _____ Class: _____ Date: _____

Do Not Use Calculator

- 1) Consider the equations $5x + 7y = 35$ and $4x + ky = -27$. 1) _____

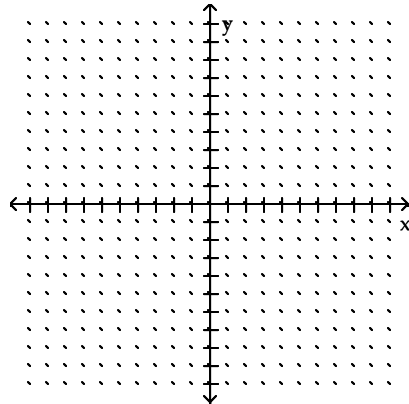
What does the value of k have to be in order for the lines to be perpendicular?

- A) $-\frac{20}{7}$ B) $-\frac{7}{20}$ C) $\frac{7}{20}$ D) $\frac{20}{7}$

- 2) Find the slope of the line determined by points $A(-8, 10)$ and $B(14, 2)$. 2) _____

- A) $\frac{4}{11}$ B) $-\frac{11}{4}$ C) 2 D) $-\frac{4}{11}$

- 3) Write an equation and sketch a graph of the line through the points $(-2, -5)$ and $(3, 8)$. 3)



- 4) Find the equation for the line through the point $P(6, 2)$ and perpendicular to the line $6x - 5y = 16$. 4) _____

- A) $y = -\frac{5}{6}x + 7$ B) $y = -\frac{5}{6}x - 3$ C) $y = \frac{6}{5}x + 7$ D) $y = \frac{6}{5}x - 3$

- 5) The table shows the enrollment growth of a pre-school from 1975 to 1995. Use a linear regression equation to estimate the enrollment in the year 2000. 5) _____

Year	Enrollment
1975	14
1980	20
1985	22
1990	28
1995	37

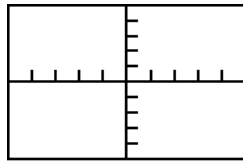
- A) 46 students B) 40 students C) 45 students D) 38 students

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6) Sketch the graph of this piecewise defined function, then find its domain and range.

6) _____

$$f(x) = \begin{cases} 2 + x, & x \leq -3 \\ x^2 & -3 < x < 1 \\ 6 & 1 \leq x \end{cases}$$



[-10, 10] by [-10, 10]

7) Let $f(x) = x + 8$ and $g(x) = x^2 - 11$.

7) _____

Find $f(g(5))$ and $g(f(5))$.

A) $f(g(5)) = 180$
 $g(f(5)) = 6$

B) $f(g(5)) = 6$
 $g(f(5)) = 180$

C) $f(g(5)) = 22$
 $g(f(5)) = 158$

D) $f(g(5)) = 22$
 $g(f(5)) = 180$

8) Given $f(x) = x^2 + 1$ and $g(x) = \frac{-7}{x}$, find $f(g(x))$ and $g(f(x))$.

8) _____

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

B) $f(g(x)) = \frac{49}{x^2} + 1$

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

D) $f(g(x)) = \frac{49}{x^2} - 1$

$g(f(x)) = \frac{49}{x^2 + 1}$

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

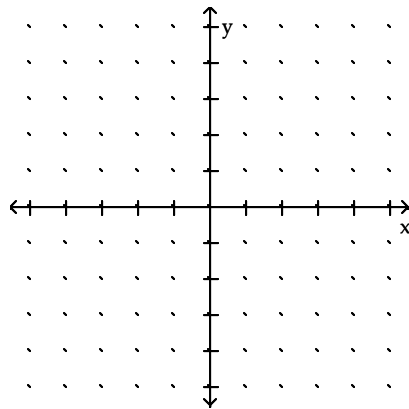
$g(f(x)) = \frac{49}{x^2} + 1$

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

9) Find the domain and range of the following function, then sketch the graph of the function.

9) _____

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



- 10) Which of the following functions is neither even nor odd? 10) _____
 Explain why.
 (a) $f(x) = x^5$
 (b) $f(x) = \tan x$
 (c) $f(x) = x^2 + 2$
 (d) $f(x) = (x-3)^2$
 (e) $f(x) = \sin x$

- 11) Use the graph of the function to determine the domain, range, and intercepts of the function 11) _____

$$y = -2^x + 6$$

- 12) Determine how much time is required for an investment to double in value if interest is earned at the annual rate of 8.75% compounded monthly. Confirm numerically. 12) _____
 A) 1 month B) 8 months C) 1145 months D) 96 months

- 13) Use a graph to solve the following equation: $7 = 2^x$. Round to the nearest thousandth. 13) _____
 A) 2.807 B) -10.099 C) 0.356 D) -2.807

- 14) The half-life of carbon-14 is 5700 years. A fossil was found to contain only 84% of its original 20 grams of carbon-14. Approximately how old is the fossil? 14) _____
 A) 994 years B) 36,436 years C) 1434 years D) 22,661 years

- 15) This table shows the population growth of a city from 1900 to 1940. 15) _____

Year	Population (thousands)
1900	26
1910	35
1920	48
1930	67
1940	81

Use an exponential regression equation to predict the population in 1960.

- A) 109,000 B) 152,000 C) 155 D) 160,000
- 16) Find a parameterization for the line segment with initial point $(-3, 6)$, terminal point $(3, 12)$, and with $0 \leq t \leq 1$. 16) _____
 A) $x = -3 - 6t$ B) $x = -3 - 6t$ C) $x = -3 + 6t$ D) $x = 6 + 6t$
 $y = 6 + 6t$ $y = 6 - 6t$ $y = 6 + 6t$ $y = -3 + 6t$

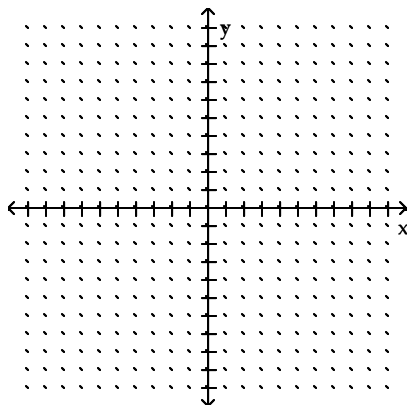
17) Choose the Cartesian equation for the parameterized curve described by $x = 5t$, $y = 25t^2$, $-\infty \leq t \leq \infty$. Describe the portion of the graph of the Cartesian equation that is traced by the parameterized curve.

17) _____

- (a) $y = x^2$ (b) $y = 2x^2$ (c) $y = 2^2$ (d) $y = 4x$

18) Graph the parametric curve defined by $x = 3 \cos t$, $y = 6 \sin t$, $0 \leq t \leq 2\pi$.

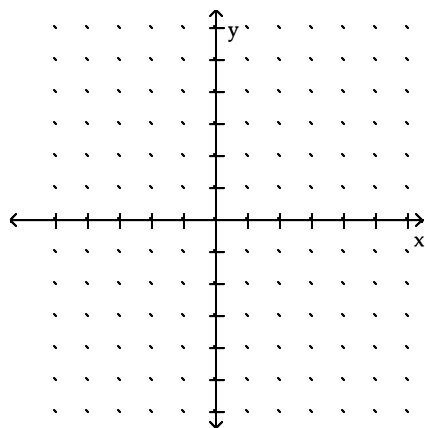
18)



19) The following parametric equations give the position $P(x,y)$ of a particle moving in the plane. Graph the curve traced by the particle and indicate the direction in which the particle moves as t increases.

19)

$x = t$, $y = \sqrt{1 - t^2}$, $0 \leq t \leq 1$

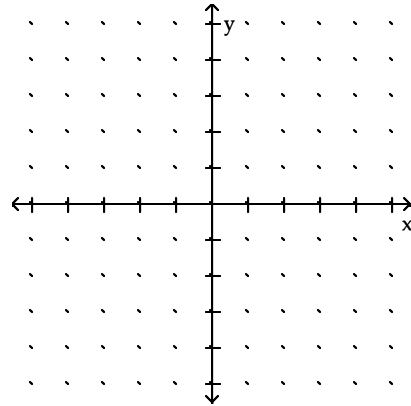


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20) Graph the following parametric equation, its inverse, and $y = x$.

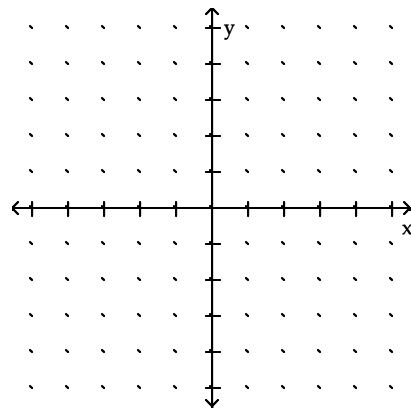
20)

$$x = t, y = t^2 \quad t \geq 0$$



21) Let $f(x) = \frac{x-3}{12}$. Find $f^{-1}(x)$, then graph $f(x)$, $f^{-1}(x)$, and $y = x$.

21)



22) Determine whether the following functions are one-to-one. Support your answers graphically.

22) _____

$$f(x) = |x + 2|$$

$$g(x) = x^2$$

$$h(x) = \sqrt{2 - 7x}$$

$$k(x) = x^3$$

23) Solve algebraically: $e^x + e^{-x} = 10$

23) _____

A) ± 1.520775

B) -0.208493

C) ± 2.292432

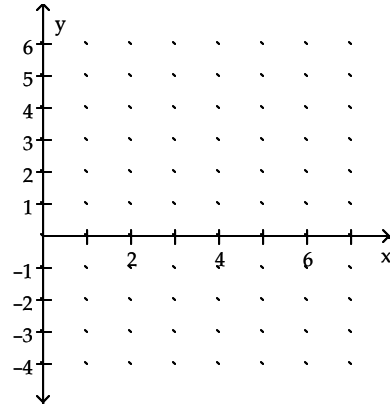
D) ± 2.129073

24) If you invest \$1000 in an account that earns 3.25% interest compounded annually, how many years will it take for the account to reach \$3500?

24) _____

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25) Sketch the graph of $y = 2 \sin(-3x + \pi) + 3$ in the interval $0 \leq x \leq 2\pi$. 25)



26) Evaluate the following expression: 26) _____

$$\tan\left(\sec^{-1}\left(\frac{25}{7}\right)\right)$$

- A) $\frac{7}{24}$ B) $\frac{7}{25}$ C) $\frac{24}{7}$ D) $\frac{24}{25}$

27) Solve the equation $\sec x = -1$ in the interval $0 \leq x \leq \pi$. 27) _____

- A) $\frac{\pi}{4}$ B) $\frac{2\pi}{3}$ C) π D) $\frac{\pi}{3}$

28) Let $y = -2 \cos(4x - \pi) + 3$. Determine the period, domain, and range of the function. 28) _____

29) An angle measuring 79 degrees has its vertex at the center of a circle whose radius is 6 feet. Find the length of the subtended arc. 29) _____

- A) 2.633 B) 2.633π C) $\frac{42,660}{\pi}$ D) 474

30) Consider the points A(-4, 2), B(2, 3), and C(2, 8). 30) _____

(a) Find the equations of the line through A that is parallel to BC and the line through C that is parallel to AB, respectively.

(b) Let D be the intersection point of the two lines you found in part (a). Find the coordinates of D.

(c) The polygon ABCD is what geometric shape?

(d) Find the slopes of the diagonals of ABCD, and tell whether the diagonals are perpendicular.

31) Let $f(x) = x^2 + 3$ and $g(x) = 3x - 4$.

31) _____

(a) Find $f(g(x))$

(b) Find $g(f(x))$

(c) Suppose $f(h(x)) = x^2 - 10x + 28$. Find a possible definition for $h(x)$.

32) (a) Let f be a one-to-one function and let $g(x) = f^{-1}(x)$. Can you be sure that g is one-to-one? Explain.

32) _____

(b) Show that $f(x) = \frac{1}{x-3} + 3$ is its own inverse.

(c) If a function h is its own inverse, what can you say about the graph of $y = h(x)$?

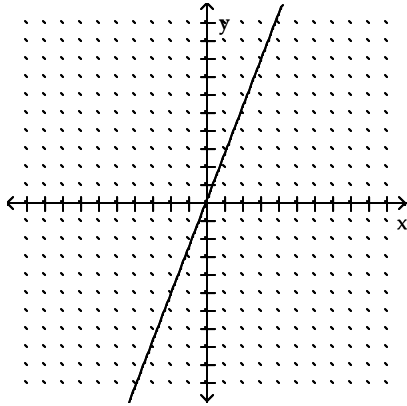
Answer Key

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1) Answer: A

2) Answer: D

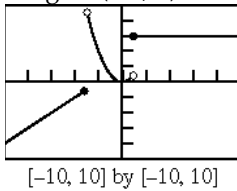
3) Answer: $y = -\frac{13}{5}x + \frac{1}{5}$



4) Answer: A

5) Answer: B

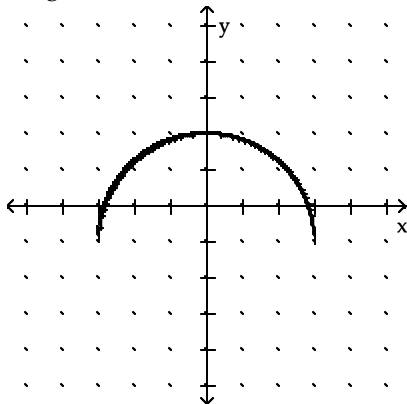
6) Answer: domain = $(-\infty, \infty)$
range = $(-\infty, 9)$



7) Answer: C

8) Answer: B

9) Answer: domain = $[-3, 3]$
range = $[-1, 2]$



10) Answer: (d) $f(x) = (x-3)^2$ is not even because $f(-x) \neq f(x)$, and is not odd because $f(-x) \neq -f(x)$.

11) Answer: domain = $(-\infty, \infty)$
range = $(-\infty, 6)$
y-intercept = 5
x-intercept = Approximately 2.58

Answer Key

Testname: SUMMER.TST

12) Answer: D

13) Answer: A

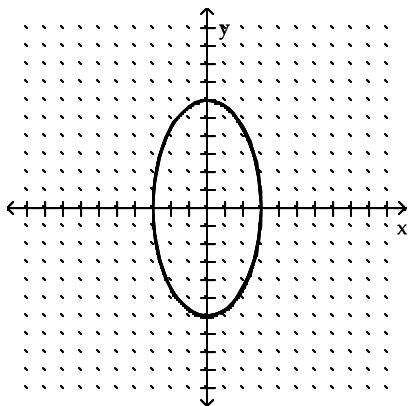
14) Answer: C

15) Answer: B

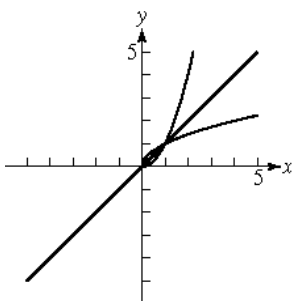
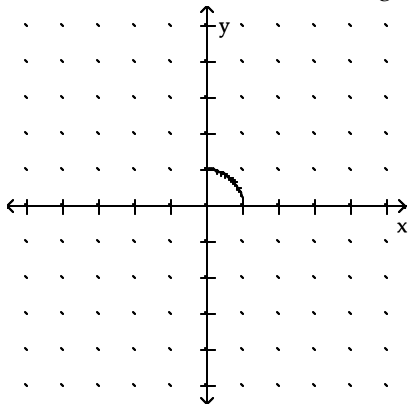
16) Answer: C

17) Answer: (a) $y = x^2$. The entire parabola is traced by the parametric curve.

18) Answer:



19) Answer: The curve is traced clockwise beginning at (0, 1) and ending at (1, 0).

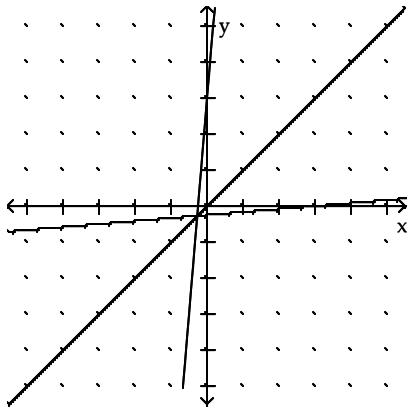


20) Answer:

Answer Key

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21) Answer: $f^{-1}(x) = 12x + 3$

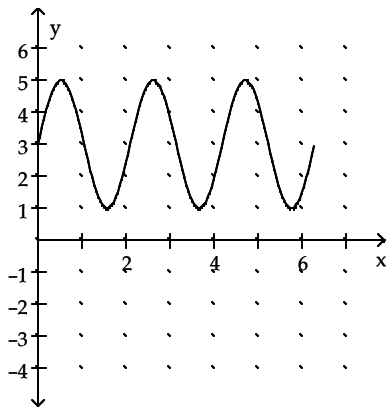


22) Answer: $f(x)$: no
 $g(x)$: no
 $h(x)$: yes
 $k(x)$: yes

23) Answer: C

24) Answer: 39.2 years

25) Answer:



26) Answer: C

27) Answer: C

28) Answer: Period: $\frac{1}{2}\pi$

Domain: $(-\infty, \infty)$

Range: $[1, 5]$

29) Answer: B

30) Answer: (a) $x = -4$; $y = \frac{1}{6}x + \frac{23}{3}$

(b) $(-4, 7)$

(c) Parallelogram

(d) Slope of AC is 1; slope of BD is $-\frac{2}{3}$; not perpendicular.

Answer Key

Testname: SUMMER.TST

31) Answer: (a) $f(g(x)) = 9x^2 - 24x + 19$

(b) $g(f(x)) = 3x^2 + 5$

(c) One possible answer: $h(x) = x - 5$

32) Answer: (a) Yes, since g has an inverse function (namely f), it is one-to-one.

(b) $f(f(x)) = \frac{1}{\left(\frac{1}{x-3} + 3\right) - 3} + 3 = \frac{1}{\frac{1}{x-3}} + 3 = (x-3) + 3 = x$

(c) The graph of $y = h(x)$ is symmetric about the line $y = x$.