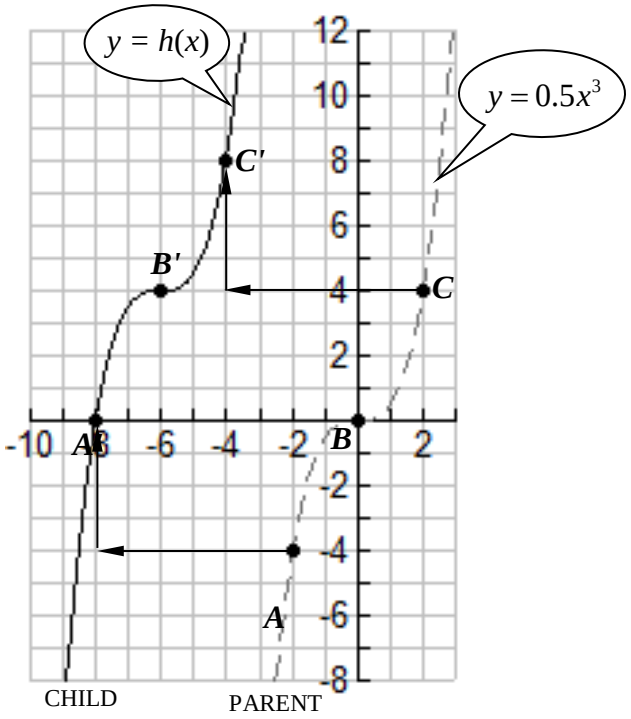
Practice Questions to Check Prerequisite Skills

1. The graph of $y = 0.5x^3$ is shown (dashed), along with the graph of $h(x)$ on the set of axes below. The graph of $h(x)$ is a translation of $y = 0.5x^3$, which has been shifted both horizontally and vertically. Points ***A***, ***B***, and ***C*** on $y = 0.5x^3$ correspond to ***A'***, ***B'***, and ***C'*** on $h(x)$, respectively.



a. Describe in words the translation of $y = 0.5x^3$ to $h(x)$.
Example: a shift left or right <*some specified number of* > units and a shift up or down <*some specified number of* > units.

b. Write the equation of $h(x)$ as a function of x.

c. At what value does the graph of $h(x)$ cross the x-axis? (This should be consistent with your formula in part **b**.)

d. At what value does the graph of $h(x)$ cross the y-axis? (You can use your formula or a grapher. No work need be shown.)

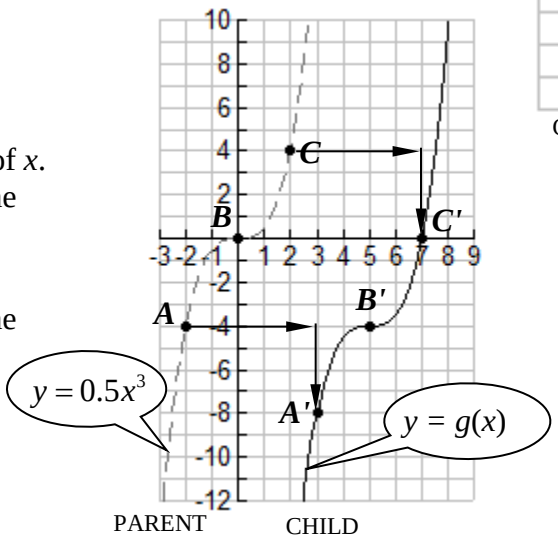
2. The graph of $y = 0.5x^3$ is shown (dashed), along with the graph of $g(x)$ on the set of axes below.

a. Describe in words the translation of $y = 0.5x^3$ to $g(x)$.

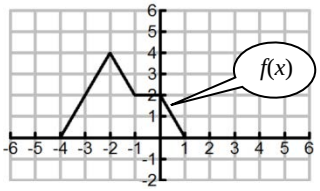
b. Write the equation of $g(x)$ as a function of x.

c. At what value does the graph of $g(x)$ cross the x-axis?

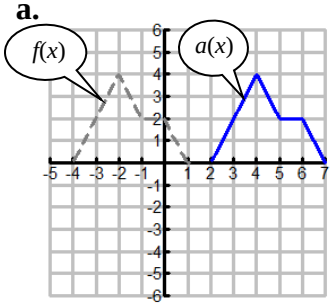
d. At what value does the graph of $g(x)$ cross the y-axis?

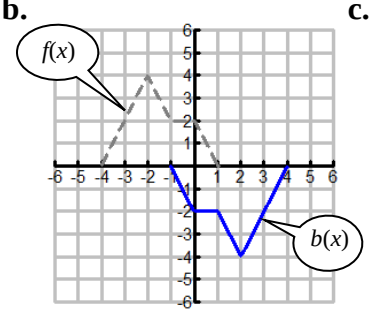


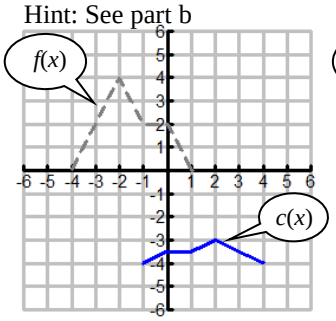
3. The graph of $y = f(x)$ is shown. The functions shown below are transformations of $f(x)$.

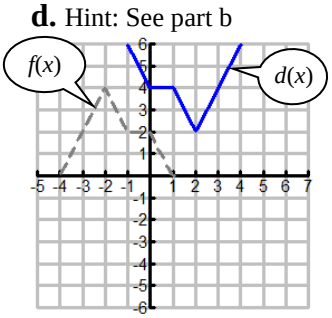


Describe each transformation and write a formula for each function in terms of $f(x)$.

a.


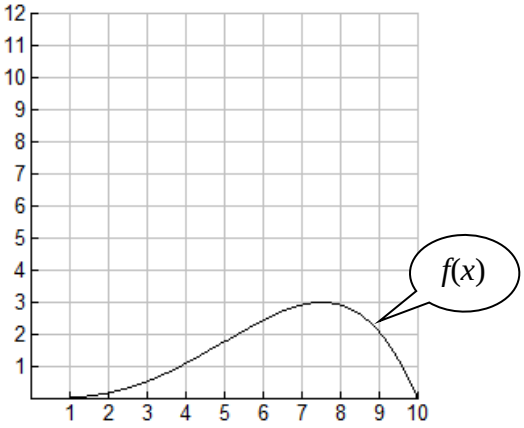
b.


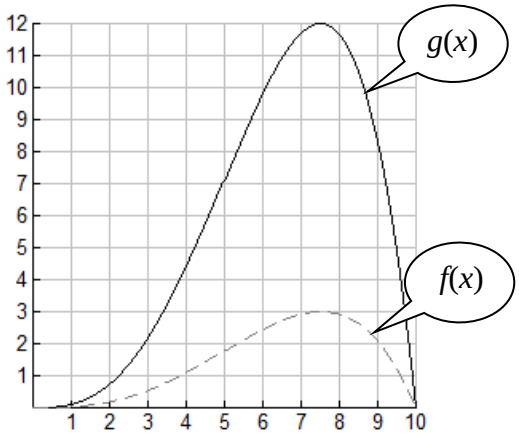
c. Hint: See part b


d. Hint: See part b


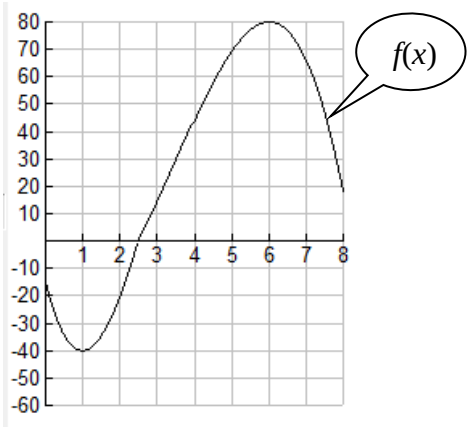
4. The graph of $y = f(x)$.is shown. Use the graph of $f(x)$ to write $g(x)$ as a transformation of $f(x)$.
Find a formula for $g(x)$ in **terms of $f(x)$.**

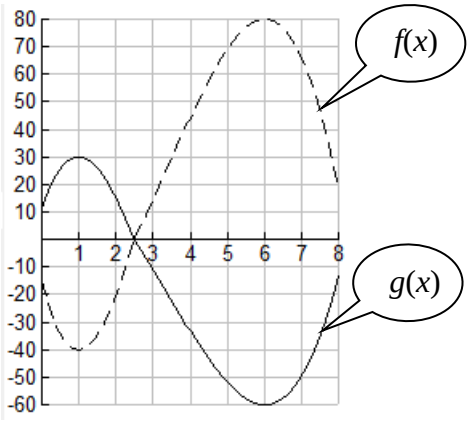
a.





b.





5. Which of these is $\ln\sqrt[3]{x^2}$? Circle one.

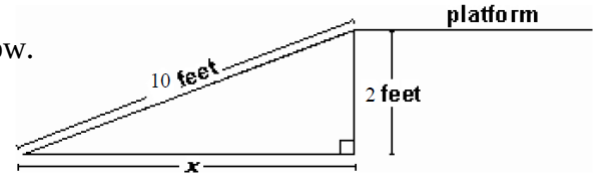
A. $3\ln\sqrt{x}$ B. $3\ln x$ C. $x\ln 3$ D. $\frac{2}{3}\ln x$ E. $\frac{3}{2}\ln x$ F. $3\ln x^2$ G. $2\ln x^3$ H. None of these.

6. Solve the equation. $e^x = 17.3$
Report both an exact solution (involving a logarithm) and an approximate solution to 2 decimal places.

7. Solve the equations. Report both an exact solution and an approximate solution to 3 decimal places.
a. $5\ln(3x) = 20$ **b**. $5\log x + 7 = 10$

8. Solve the equations.
a. $4u(u-2)=0$ **b**. $25u^2 = 4$ **c**. $25u^2 = 4u$ **d**. $13x - 4x^2 = 0$ **e**. $13x - 4x^2 = 3$
f. $2u^2 = u + 1$

9. Use the diagram to the right to answer the question below.
The figure is not drawn to scale.



A ramp feet 10 long is leaning against a raised platform which is 2 feet above the ground.
What is the distance from the ramp's contact point with the ground and the base of the platform?

A. 8 feet B. $\sqrt{104}$ feet C. $\sqrt{96}$ feet D. 6 feet E. None of these.

10. Jonesville and Smithville each have a population of 5000 size at year $t = 0$.
Suppose Jonesville's population grows by 200 people per year.
Suppose the population of Smithville grows by 2% per year.

a. Which is true? (Circle one)

A. Both towns are growing exponentially.
B. Jonesville is growing linearly and Smithville is growing exponentially.
C. Jonesville is growing exponentially and Smithville is growing linearly.
D. Both towns are growing linearly.

b. Find a formula for the population of the town of Jonesville at year t. $P =$ _____

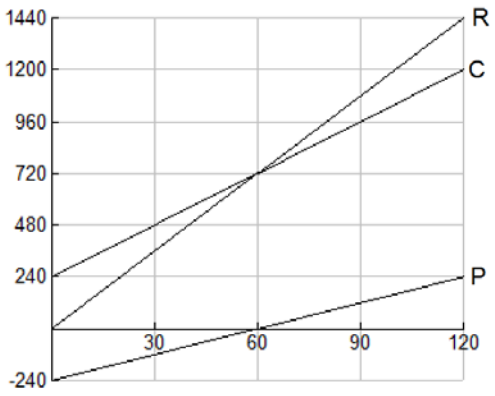
c. Find a formula for the population of the town of Smithville at year t. $P =$ _____

11. In the year 1900 the population P of a town was 200. The town grew by 23% every year.
In the year 1900 the population Q of a town was 400 people but it grew by 200 people every year.

a. Write formulas for P and Q.

b. Find how many years it will take after 1900 for the population of Q to overtake the population of P. Report your solution to 2 decimal places.

12. The revenue $R(x)$, cost $C(x)$, and profit $P(x)$ for a product are graphed in the figure to the right, where x is the quantity produced and sold. **Note:** $P(x) = R(x) - C(x)$



a. Determine the number of items that must be sold to break even, i.e., revenue is equal to costs.
The break-even quantity is ☐ units sold.

b. Find the formulas of the three functions.

$P(x) =$ _____

$R(x) =$ _____

$C(x) =$ _____

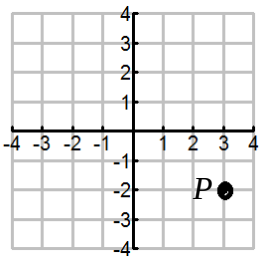
13. Use the compound interest formulas $A = P(1+\frac{r}{n})^{nt}$ and $A = Pe^{rt}$ as appropriate.
Suppose that you have \$6000 to invest. Which investment yields the greater return over 13 years: 8.07% compounded **continuously** or 8.1% compounded **monthly**? (Select one)

A. Investing \$6000 at 8.07% compounded **continuously** over 13 years yields the greater return.
B. Investing \$6000 at 8.1% compounded **monthly** over 13 years yields the greater return.
C. Both investments yield the same return.

14. Use the compound interest formulas $A = P(1+\frac{r}{n})^{nt}$ and $A = Pe^{rt}$ as appropriate.
Suppose that you have \$9000 to invest. Which investment yields the greater return over 19 years: 7.88% compounded **continuously** or 7.9% compounded **monthly**? (Select one)

A. Investing \$9000 at 7.88% compounded **continuously** over 19 years yields the greater return.
B. Investing \$9000 at 7.9% compounded **monthly** over 19 years yields the greater return.
C. Both investments yield the same return.

15. Suppose the point $P(3,-2)$ is a point on the graph of $y = f(x)$



a. Suppose $f(x)$ is **even:**

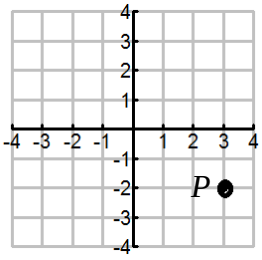
i. Report the coordinates of another point Q, which corresponds to P. (____ , ____)

ii. Plot the point Q on the grid provided.

b. Suppose $f(x)$ is **odd**:

i. Report the coordinates of another point Q, which corresponds to P. (____ , ____)

ii. Plot the point Q on the grid provided.



16. **a**. Assume the table represents a **linear** function.

i. Complete the box in the first row and the last row.

x	y
0	
1	125
2	85
3	45
4	

ii. Report the **equation** of the line in slope-intercept form:

$y =$ ☐ $x +$ ☐

b. Assume the table represents an **exponential** function.

i. Complete the box in the first row and the last row.

x	y
0	
1	128
2	32
3	8
4	

ii. If we report the equation of the exponential function in the form $y = ab^x$, then we have

$a =$ ☐ and $b =$ ☐