Practice Questions for MA 15300 Test 3

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1) The graph of $y = 0.5x^3$ is shown (dashed), along with the graph of $h(x)$ on the set of axes in Figure 1. 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.

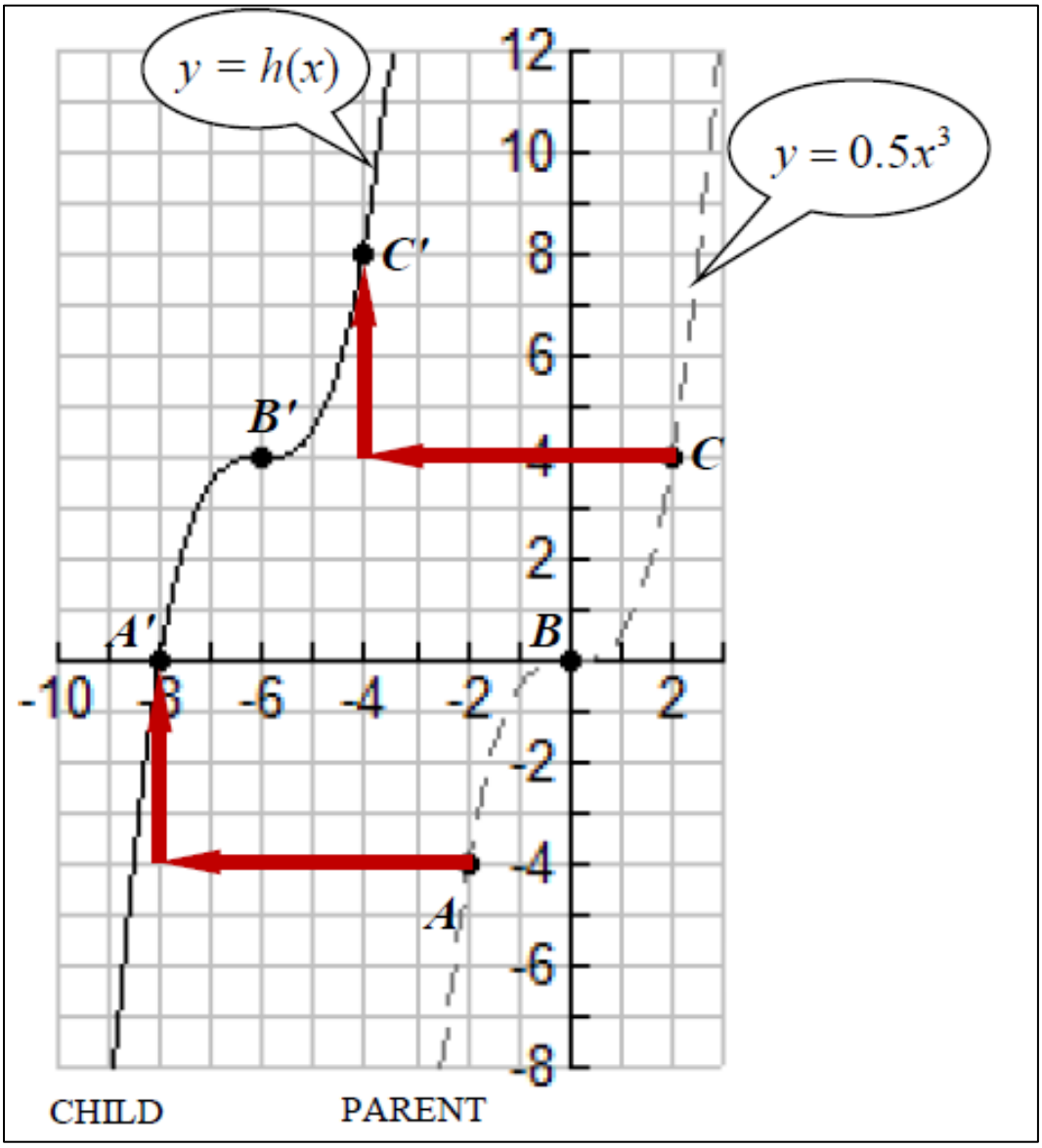

Figure 1: Translation of $y = 0.5x^3$ to $y = h(x)$

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 in Figure 2. 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 $g(x)$, respectively.

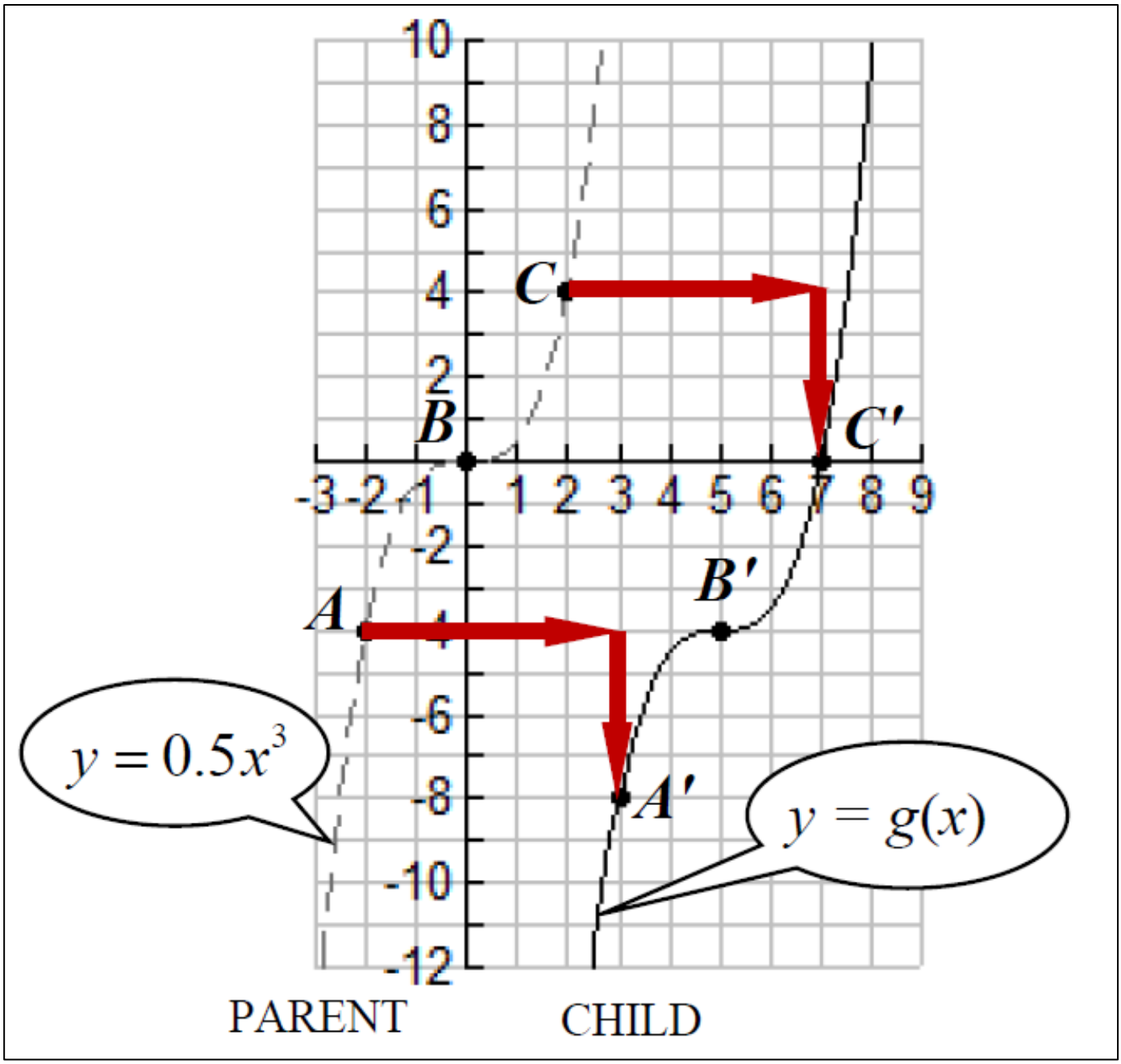

Figure 2: Translation of $y = 0.5x^3$ to $y = g(x)$

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

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

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

3) Suppose $y = f(x)$ is given by the graph below.

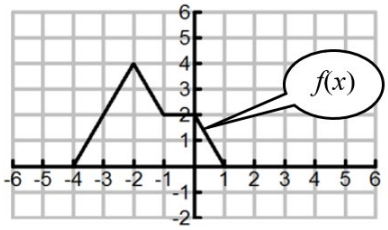

Figure 3: Graph of $y = f(x)$

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

a) What is the formula for $a(x)$?

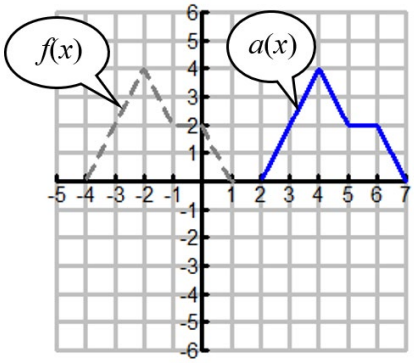

Figure 3a: Graph of $y = f(x)$ and $y = a(x)$.

b) What is the formula for $b(x)$?

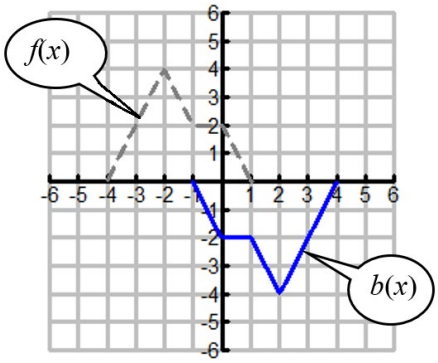

Figure 3b: Graph of $y = f(x)$ and $y = b(x)$.

c) What is the formula for $c(x)$? Hint: Part b) might be helpful.

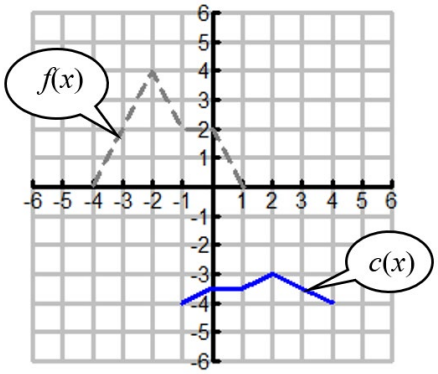

Figure 3c: Graph of $y = f(x)$ and $y = c(x)$.

4) 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 $P(3,-2)$. Q (____ , ____).

ii) Plot the point Q on the grid provided.

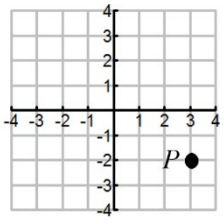

Figure 4a: Grid for 4a)

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

i) Report the coordinates of another point R, which corresponds to $P(3,-2)$. R (____ , ____)

ii) Plot the point R on the grid provided.

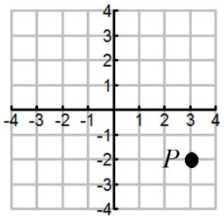

Figure 4b: Grid for 4b)

5) A ballet dancer jumps in the air. The height, $h(t)$, in feet, of the dancer at time, t in seconds since the start of the jump, is given by $h(t) = -16t^2 + 12t$. No work need be shown. **Do not round off any calculations.**

a) Write the function in factored form.
b) Report the zeros of the function.
c) Report the vertex of the function.
d) Write the equation of the axis of symmetry.
e) How much time in seconds is the dancer in the air?
f) What is the maximum height of the jump?
g) When does the maximum height of the jump occur?
h) Write the formula in *vertex form*.

6) Write formulas for the parabolas You may use vertex form, factored form, or standard form, whichever is most efficient. **SHOW ALL WORK.**

a)

Figure 6a: Parabola for part 6a.

b)

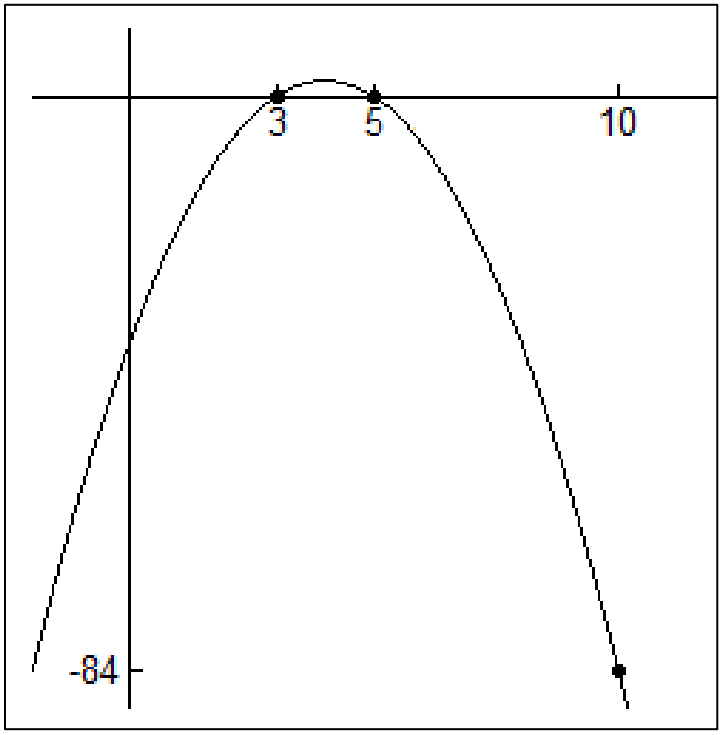

Figure 6b: Parabola for part 6b.

c)

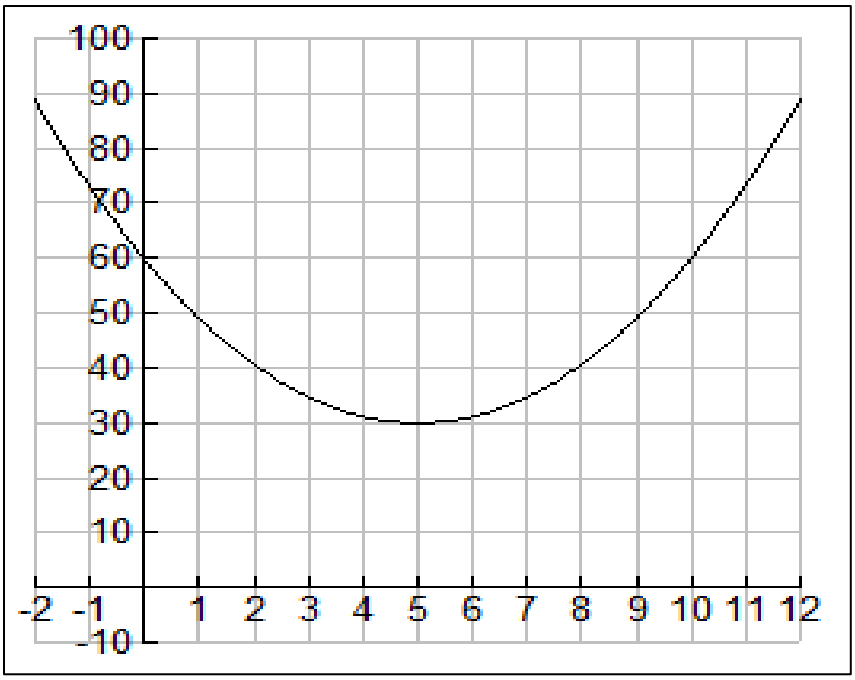

Figure 6c: Parabola for part 6c

7) The graph of $y = f(x)$.is shown. It is not a parabola.

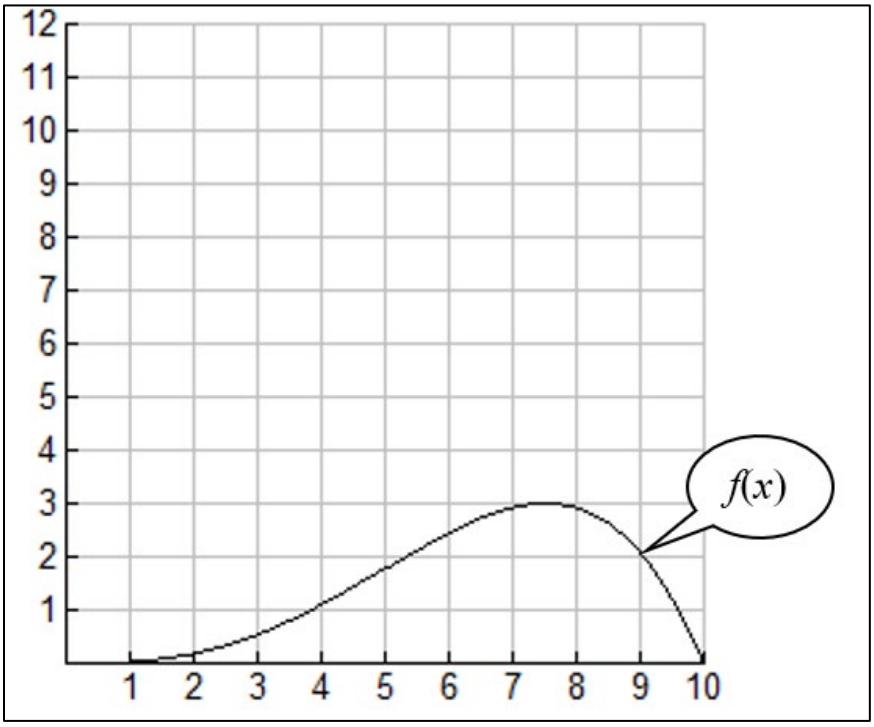

Figure 7a: Graph of $y = f(x)$

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 $f(x)$.**

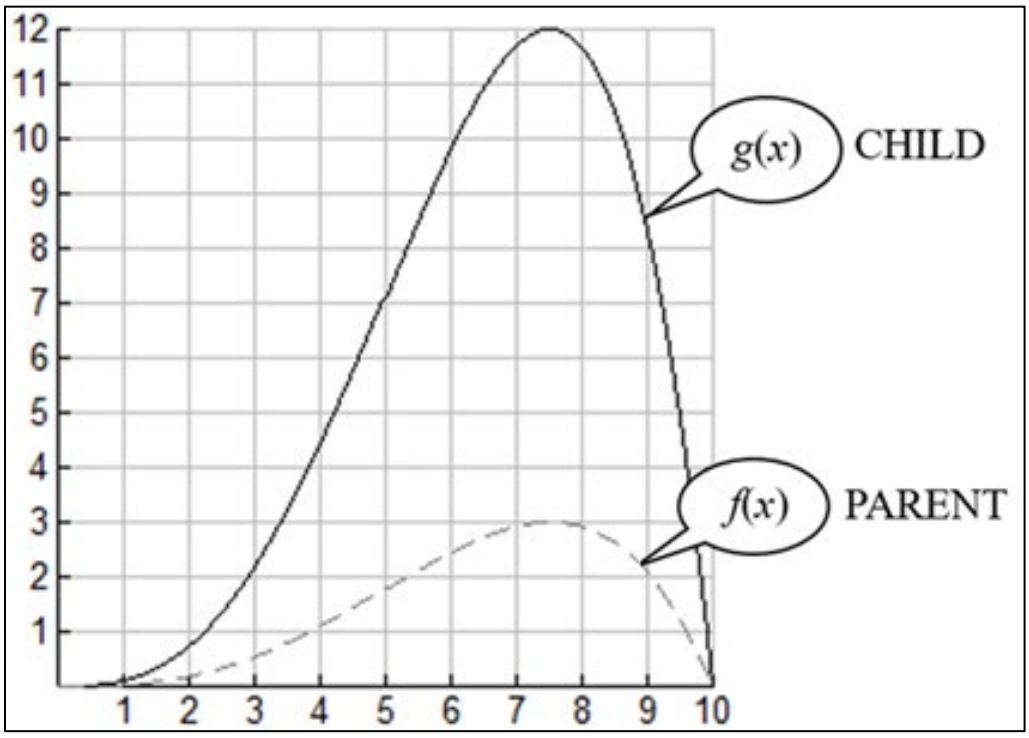

Figure 7b: Graph of $y = f(x)$ and $y = g(x)$.

8) The graph of $y = f(x)$ is shown.

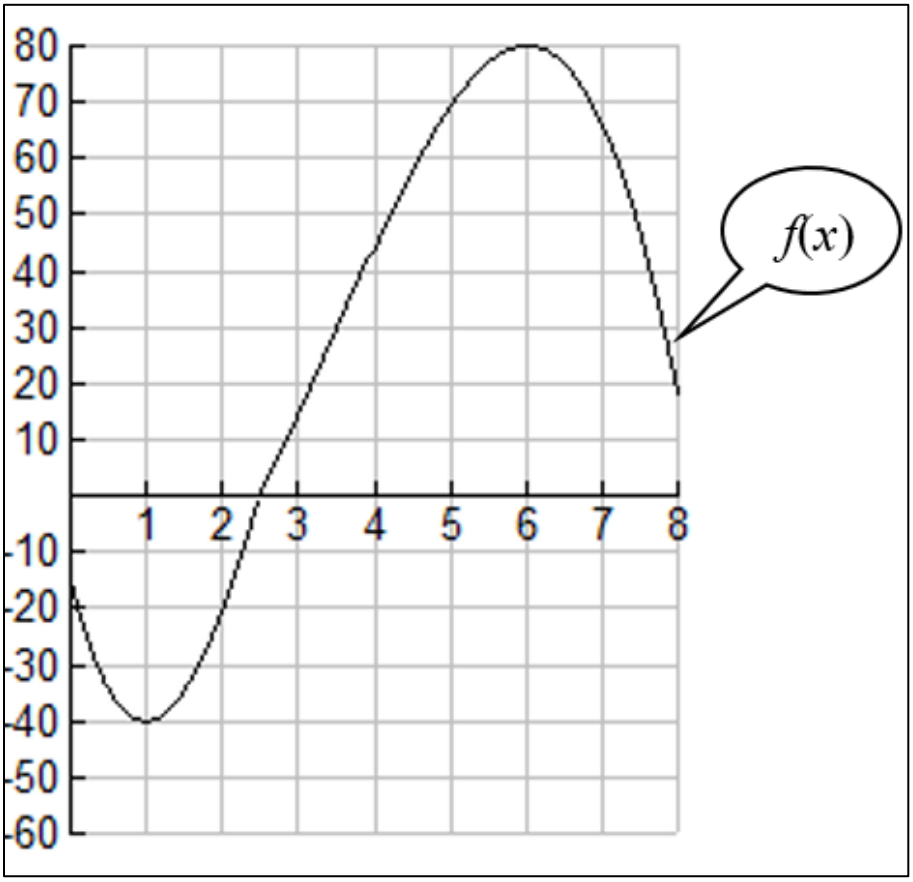

Figure 8a: Graph of $y = f(x)$.

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).

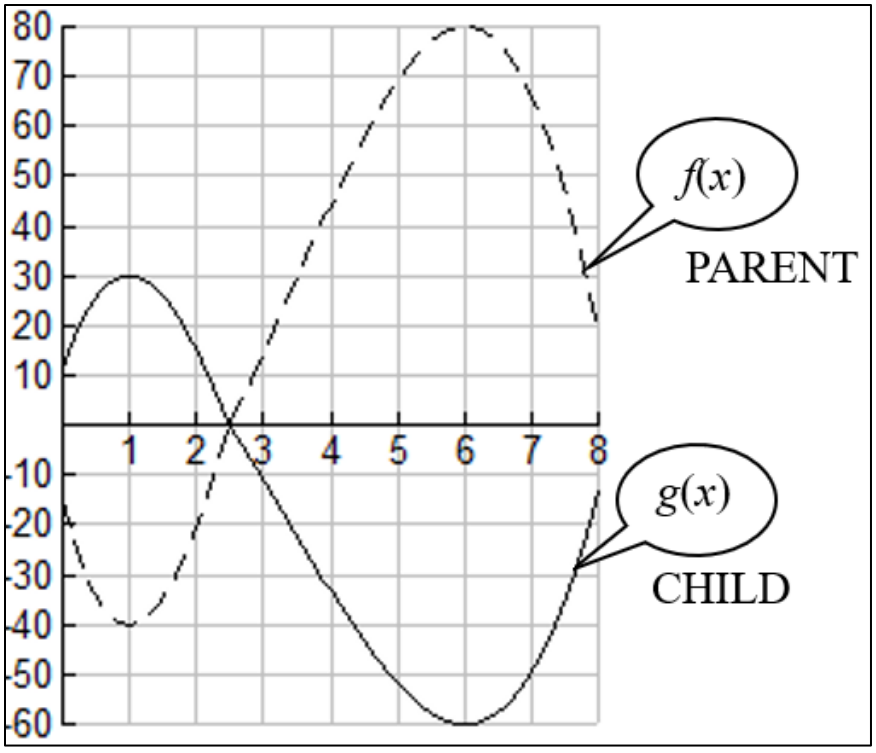

Figure 8b: Graph of $y = f(x)$ and $y = g(x)$.

9) The graphs below are power functions of the form $y = kx^p$.

a)

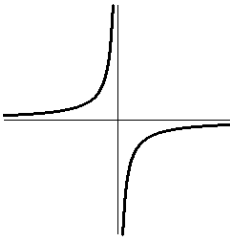

Figure 9a

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

b)

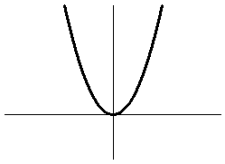

Figure 9b

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

c)

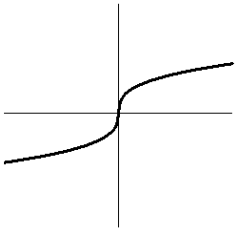

Figure 9c

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

d)

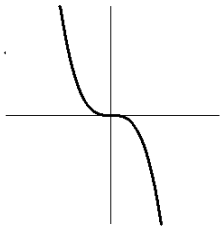

Figure 9d

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

e)

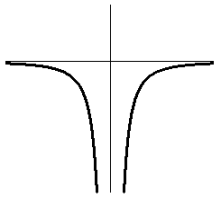

Figure 9e

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

f)

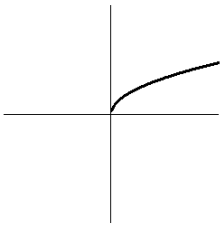

Figure 9f

i) Which is true about the leading coefficient, *k*? SELECT ONE.
- The leading coefficient, *k*, is negative.
- The leading coefficient, *k*, is positive.

ii) Which is true about the power, *p*? SELECT ONE.
- The power *p* is even (like ±2, ±4,…).
- The power *p* is odd (like ±1, ±3,…).
- The power *p* is fractional (like $\pm\frac{1}{2}, \pm\frac{1}{3}, \pm\frac{1}{4}, \pm\frac{1}{5}$,…).

iii) Which is true about the symmetry of the graph? SELECT ONE.
- The symmetry of the graph is even.
- The symmetry of the graph is odd.
- The symmetry of the graph is neither even nor odd.

10) Find the formula for the power function $y = kx^p$ given by each table. Show work.

a) Table 10a

x	*y*
1	2
16	128

b) Table 10b

x	*y*
81	900
625	1500

11) Consider the polynomial $f(x) = 80 + 70x - 30x^3 - 5x^7$.
a) Report the leading term.
b) Report the leading coefficient.
c) Report the degree of $f(x)$.
d) Report the long run behavior of $f(x)$. SELECT ONE.

- "up up" 
- "down down" 
- "down up" 
- "up down" 

12) Consider the polynomial $g(x) = -20(x-50)^4(x+200)^2$.
a) Report the leading term.
b) Report the leading coefficient.
c) Report the degree of $f(x)$.
d) Report the long run behavior of $f(x)$. SELECT ONE.

- "up up" 
- "down down" 
- "down up" 
- "up down" 

13) Use the graph to write each polynomial in factored form.

a) $p(x) = x^3 - 31x + 30$.

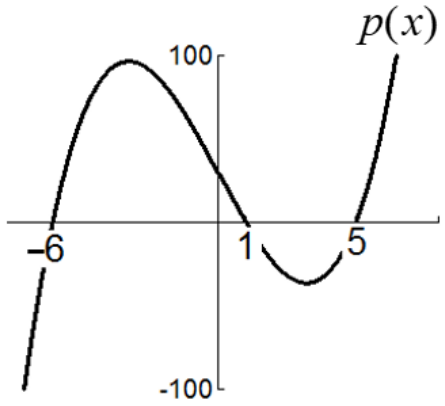

Figure 13a

b) $q(x) = x^4 + 3x^3 - 4x$

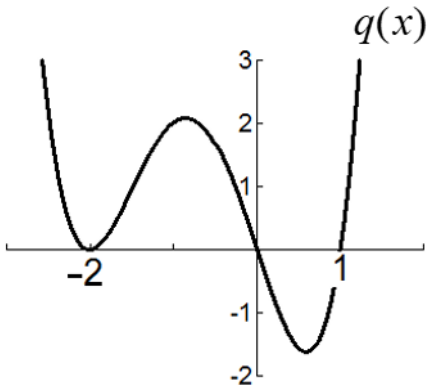

Figure 13b

14) Suppose the polynomial f graphed in figure shows its entire long run behavior and has leading term ax^n, that is, $f(x) = ax^n$ + remaining terms of lower degree.

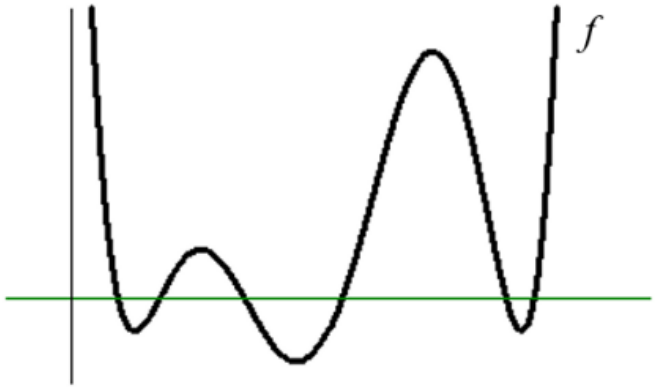

Figure 14

a) Is the degree, n, of the leading term even or odd?
b) Is the leading coefficient, a, positive or negative?
c) Report the minimum possible value of n. $n \geq$ ___

15) Write a possible formula for each polynomial function.

a) Consider the polynomial shown. Report long run and short run behavior.

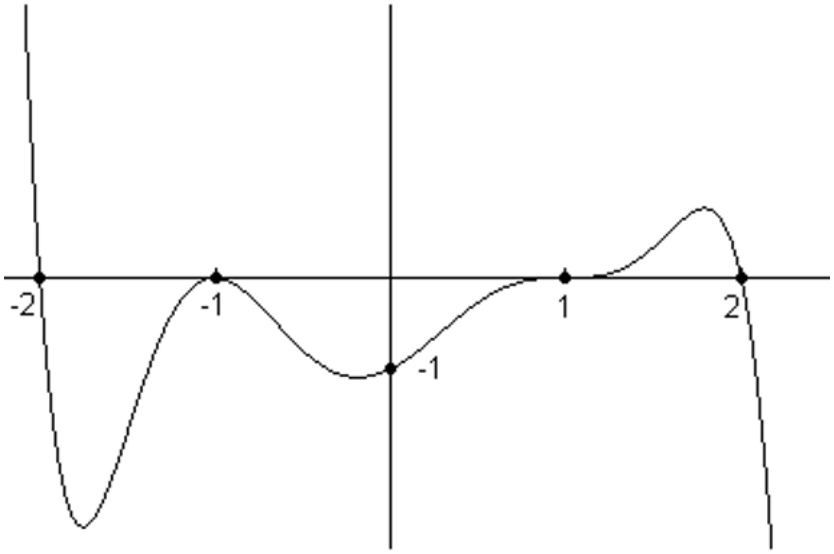

Figure 15a

b) Consider the polynomial shown. Report long run and short run behavior.

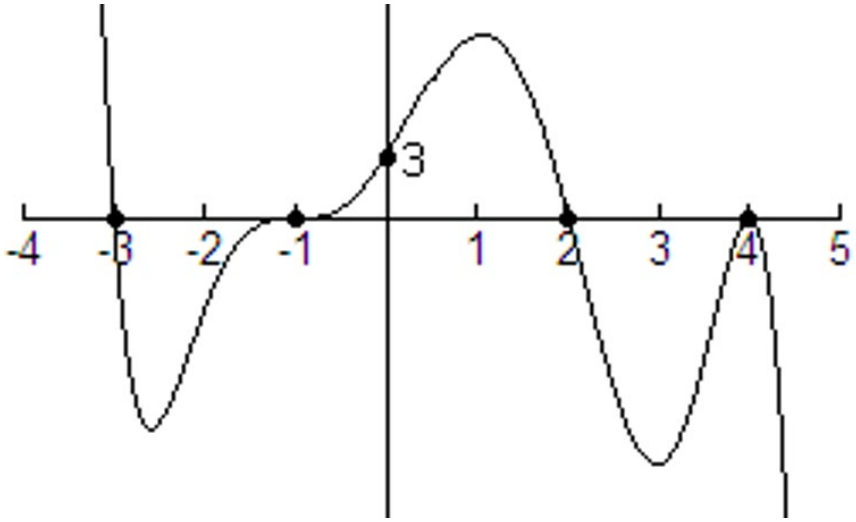

Figure 15b

16) A model rocket is launched from the roof of a building with height h_0. Its height above ground (in meters) t seconds later is given by $h = f(t) = -5t^2 + 40t + 20$. Answer the following.
All work may be done on the calculator. No work need be shown.

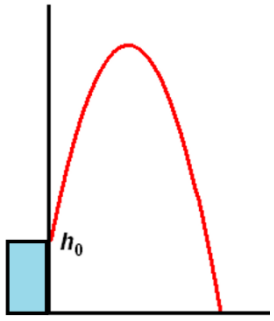

Figure 16 is not necessarily to scale.

a) What is the value of h_0, the initial height of the rocket? Please report with correct units.
b) When will the rocket hit the ground? Report accurate to two decimal places.
c) What is the **exact** maximum height of the rocket? Please report with correct units.
d) When will the rocket reach its maximum height? Please report with correct units.
e) What length of time will the rocket be 15 feet or higher? Report accurate to two decimal places.
f) Give the domain of the function (restricted according to the ***context of the problem situation***.)
g) Give the range of the function (restricted according to the ***context of the problem situation***.)

For a worked out key, see your Brightspace course.
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Find these in your Brightspace course in the module **Flash Cards and Just for Practice Sets**.