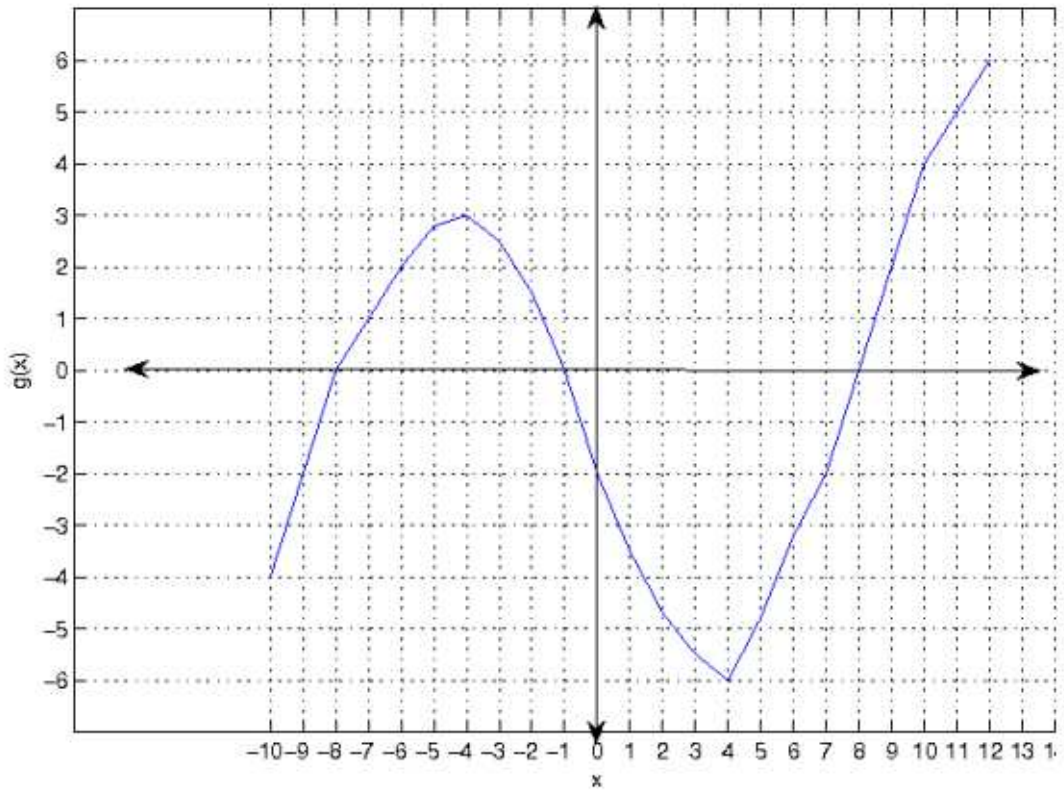


Directions

1. read all instructions carefully.
2. Answer all seven questions.
3. Show all your work..
4. You are **not allowed** to use any notes or index cards.
5. Approximations will not be accepted, where *exact* answers are required.
6. Example: **1.412412...** will not be accepted in place of the *exact* value $\sqrt{2}$.
7. Cell phones or any other communications devices must be turned off during the exam.
8. Any act of dishonesty in the examination is a cause for dismissal from the University.
9. Make sure you read #1 above.

1. Using the graph, $g(x)$, given below, answer the following questions.

- (a) (2pt) What is the domain of $g(x)$?
- (b) (2pt) What is the range of $g(x)$?
- (c) (2pts) For what values of x is $g(x)$ decreasing?
- (d) (3pts) Does $g^{-1}(x)$ exist? Justify your answer.
- (e) (3pts) What is $g(0)$?
- (f) (3pts) What are the solutions of $g(x) = 0$?



2. (3pts each part) A closed box has a square base of side x centimeters and height h centimeters.
- Write an equation for the surface area S of the box in terms of x and h .
(Hint: Be sure to include all four sides, the top, and the bottom of the box.)
 - If the volume of the box is **850** cubic centimeters, write an equation in x and h equivalent to **850**.
 - Using, your answer to part *b* above, write h as a function of x .
 - Write your answer for part *a* above (equation for the surface area S) as a function of x .
 - Find the value of x that produces the smallest value of S .
3. (10pts) What is the domain of the function give by $f(x) = \sqrt{x-5} + \frac{3}{x-8}$?
4. (15pts) Given that $f(x) = x^2 - 2x + 3$, compute and simplify the difference quotient:

$$\frac{f(x+h) - f(x)}{h}, h \neq 0$$

5. As a spherical weather balloon is inflated, it's radius increases at the rate of 5 centimeters per second.
- (5pts) Express the radius, r , as a function of time, t , measured in seconds.
 - (5pts) Express the volume of the balloon as a function of time, given the volume of a sphere of radius r is $\frac{4\pi r^3}{3}$.
 - (5pts) Find the volume after **3** seconds. Give the answer with proper units.
6. (15pts) Given $f(x) = \sqrt[5]{\frac{5x-1}{x-2}}$, find it's inverse function $f^{-1}(x)$.
7. (15pts) Given $f(x) = x^2 + 3x + 5$, write the rule of the function $g(x)$ obtained by the following transformation, in the given order, on $f(x)$
- Shift horizontally **3** units to the right.
 - Stretch vertically by a factor of **2**.
 - Reflect in the x axis.
 - Shift vertically **7** units upward.