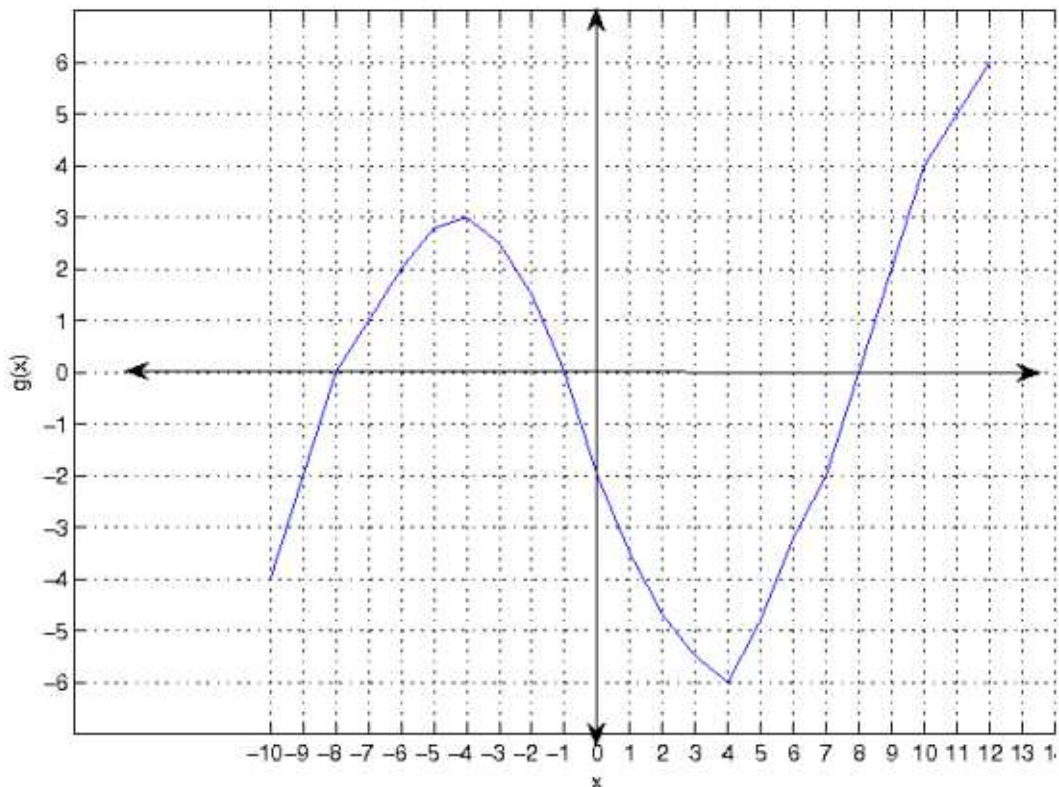


Directions

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. a student leaves the university at 1:00pm, bicycling South at a constant rate of x mph. At 2:00pm another student leaves the same point and heads West, bicycling 5 mph faster than the first student.

- (a) (5pts) Write the speed of the second student as a function of x .
- (b) (10pts) If they are 20 miles apart at 4:00pm, find their speeds approximately to two places of decimals.

3. (10pts) What is the domain of the function given by $f(x) = \frac{(x-3)}{x-7}$?

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 6 centimeters per second.

- (a) (5pts) Express the radius, r , as a function of time, t , measured in seconds.
- (b) (5pts) Express the volume of the balloon as a function of time, given the volume of a sphere of radius r is $\frac{4\pi r^3}{3}$.
- (c) (5pts) Find the volume after 5 seconds. Give the answer with proper units.

6. (15pts) Given $f(x) = \sqrt[7]{\frac{3x-2}{x-3}}$, find it's inverse function $f^{-1}(x)$.

7. (15pts) Given $f(x) = x^6 + 2x + 3$, write the rule of the function $g(x)$ obtained by the following transformation, in the given order, on $f(x)$

- i. Shift horizontally 2 units to the right.
- ii. Stretch vertically by a factor of 3.
- iii. Reflect in the x axis.
- iv. Shift vertically 5 units upward.