

# Quiz #1-2 Key

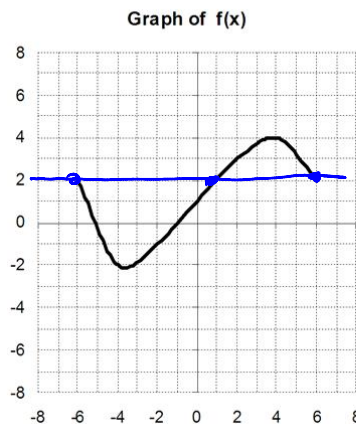
Wednesday, September 17, 2008  
8:25 AM

## Precalculus BC Quiz #1-2 Hungerford 2.4, 3.1-3.2

Name: Key Per: September 16-17, 2008

Use the graph at right to answer questions 1-5 (1 pt each)

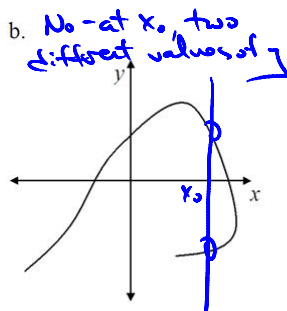
- Find the domain of  $f$ .  $[-6, 6]$
- Find the range of  $f$ .  $[-2.2, 4]$  or thereabouts
- Find all numbers  $x$  such that  $f(x) = 2$ .  $x = -6, 1, \text{ or } 6$
- Find all intervals on which  $f$  is decreasing.  $(4, 6) \cup (-6, -3.5)$
- Find the coordinates of all points of inflection on the graph of  $f$ .  $(0, 1)$  or thereabouts



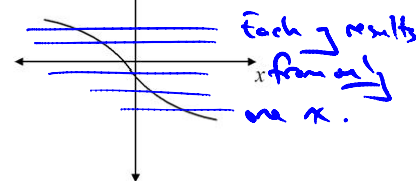
6. In each case, determine whether  $y$  is a function of  $x$ . If a function, indicate whether it is one-to-one. (2 pts each)

a.  $x^2 + y^3 = 64$

$y = \sqrt[3]{64 - x^2}$   
Yes,  $y$  is a  $f^{\text{th}}$  of  $x$ .  
No, it is not one-to-one



c. Yes,  $y$  is a  $f^{\text{th}}$  of  $x$ .  
Yes,  $y$  is 1-1 func



7. If  $f(x) = (x + 2)^2$ , find a simplified expression for each. Show at least one substitution for full credit! (2 pts each)

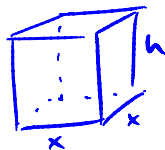
a.  $f(2x)$

$f(2x) = (2x + 2)^2 = 4x^2 + 8x + 4$

b.  $f(x + h)$

$f(x + h) = ((x + h) + 2)^2 = x^2 + 2xh + h^2 + 4x + 4h + 4$

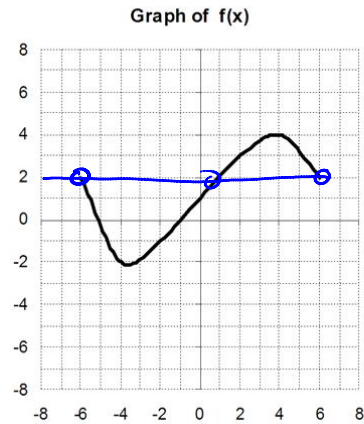
8. A rectangular box with square bottom and no top is to have a total surface area of  $100 \text{ cm}^2$ . Find the maximum possible volume. (4 pts)



$V = x^2 h$  ← Objective  
 $x^2 + 4xh = 100$  ← constraint  
 $\therefore h = \frac{100 - x^2}{4x}$   
 $\therefore V = x^2 \left( \frac{100 - x^2}{4x} \right)$   
 Graph, find max @  $x \approx 5.7735$ ,  $V \approx 389.9$

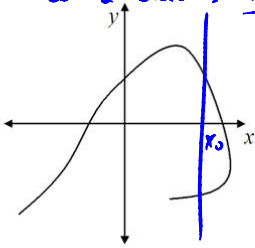
Use the graph at right to answer questions 1-5 (1 pt each)

- Find the range of  $f$ .  $[-2, 4]$  or thereabouts
- Find the domain of  $f$ .  $[-6, 6]$
- Find all numbers  $x$  such that  $f(x) = 2$ .  $-6, 1, 6$
- Find all intervals on which  $f$  is increasing.  $(-3, 8, 4)$  or thereabouts
- Find the coordinates of all points of inflection on the graph of  $f$ .  $(0, 1)$



6. In each case, determine whether  $y$  is a function of  $x$ . If a function, indicate whether it is one-to-one. (2 pts each)

a. No - for  $x_0$ , there are 2 values of  $y$



b.  $x^2 + y^3 = 64$

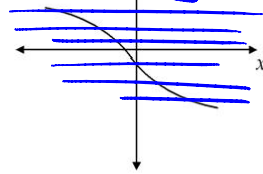
Yes:

$$y = \sqrt[3]{64 - x^2}$$

Not 1-1:

For  $x = 4$  or  $-4$ , same  $y$  ( $\pm 4\sqrt[3]{3}$ )

c. Yes & yes. For each  $y$ , there is only one  $x$ .



7. If  $f(x) = (x-2)^2$ , find a simplified expression for each. Show at least one substitution for full credit! (2 pts each)

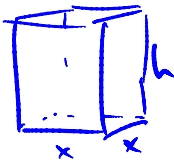
a.  $f(2x)$

$$(2x-2)^2 = 4x^2 - 8x + 4$$

b.  $f(x+h)$

$$(x+h-2)^2 = x^2 + 2xh + h^2 - 4x - 4h + 4$$

8. A rectangular box with square bottom and no top is to have a total surface area of  $200 \text{ cm}^2$ . Find the maximum possible volume. (4 pts)



$$A = x^2 + 4xh = 200 \text{ (Constraint)}$$

$$V = x^2h \text{ (Objective)}$$

$$\therefore V(x) = x^2 \cdot \left( \frac{200 - x^2}{4x} \right)$$

Obtained by solving constraint for  $h$ .

Graph to find max:

$$x \approx 8.16, V_{\max} \approx 272.17$$