

Functions, Domains and Composites

Lecture 22

1. Determine whether each of the following is a function and why or why not.

a. $\{(1, 4), (3, 5), (4, 4)\}$

b. $\{(1, 4), (3, 5), (1, 5)\}$

c. $x + 2y = 7$

c. $x^2 + y^2 = 4$

2. Find the domain of each of the following functions. If unsure, graph the function using your calculator.

a. $f(x) = \frac{5x - 4}{3x + 2}$

e. $f(x) = \sqrt{7x + 1}$

b. $f(x) = \frac{2x + 7}{12x^2 + x - 20}$

f. $f(x) = \sqrt{2x^2 - 3x - 2}$

c. $f(x) = \frac{x - 7}{x^2 + 3}$

g. $f(x) = \sqrt{\frac{x + 3}{x - 2}}$

d. $f(x) = \sqrt{5 - 2x}$

h. $f(x) = \frac{\sqrt{x - 1}}{x^2 - 25}$

3. Find $f(g(x))$ and $g(f(x))$ for each of the following

a. $f(x) = 3x + 2$
 $g(x) = 2x^2$

b. $f(x) = 3x^2 + 2x - 1$
 $g(x) = 4x - 5$

c. $f(x) = \frac{2x + 5}{4x - 3}$
 $g(x) = \frac{x + 2}{3x - 1}$

4. Find $g(x)$ if $f(x) = \frac{3x - 1}{2x + 5}$, and $f(g(x)) = \frac{x + 9}{12x - 11}$.

(3) Find all values of x such that $f(g(x)) = g(f(x))$ if $f(x) = 2x^2 - 3x + 2$, and $g(x) = 3x - 2$.

Inverses

Lecture 23

1. Graph $f(x) = 2x - 3$. Find $f^{-1}(x)$ and graph it on the same coordinate plane. Label three points on each graph. Do you notice anything?

2. Find $f^{-1}(x)$ for each of the following functions.

a. $f(x) = 6x + 2$

d. $f(x) = \frac{5}{2x - 1}$

b. $f(x) = \sqrt{2x - 5}$

e. $f(x) = \frac{5x - 2}{2x + 1}$

c. $f(x) = -\sqrt{2 - 3x}$

f. $f(x) = 2(x - 3)^3 + 7$

3. Find $g(x)$ if $f(x) = \frac{3x + 5}{2x - 1}$, and $g(f(x)) = x$.

Lecture 24

Limits as $x \rightarrow \#$

Find each of the following limits please.

1. $\lim_{x \rightarrow 2} \left(\frac{2x+1}{3x-5} \right)$

9. $\lim_{x \rightarrow 2} \left(\frac{3x^2 - 2x - 8}{x^2 - x - 2} \right)$

2. $\lim_{x \rightarrow 6} \left(\frac{x+1}{x-6} \right)$

10. $\lim_{x \rightarrow \frac{1}{2}} \left(\frac{8x^3 - 1}{6x^2 + 5x - 4} \right)$

3. $\lim_{x \rightarrow 3} \left(\frac{x^2 - 9}{x^2 + 9} \right)$

11. $\lim_{x \rightarrow \infty} \left(\frac{2x+3}{3x-5} \right)$

4. $\lim_{x \rightarrow -3} \left(\frac{x^2 - 9}{x - 3} \right)$

12. $\lim_{x \rightarrow \infty} \left(\frac{5x^2 - 3x - 7}{x^3 - x^2 - 2} \right)$

5. $\lim_{x \rightarrow 3} \left(\frac{x^2 - 9}{x^3 - 27} \right)$

13. $\lim_{x \rightarrow \infty} \left(\frac{(1-2x)^3}{5x^3 - 4} \right)$

6. $\lim_{x \rightarrow 0} \left(\frac{x^2 + x}{x^2 - x} \right)$

14. $\lim_{x \rightarrow -2} \left(\frac{x^3 + 8}{x^4 - 16} \right)$

7. $\lim_{x \rightarrow -2} \left(\frac{2x^2 + 3x - 2}{x^3 + 8} \right)$

15. $\lim_{x \rightarrow 3} \left(\frac{\sqrt{2x+3} - 3}{x^2 - 2x - 3} \right)$

8. $\lim_{x \rightarrow 5} \left(\frac{x^2 - 10x + 25}{2x^2 - 8x - 5} \right)$

16. $\lim_{x \rightarrow 4} \left(\frac{5 - \sqrt{6x+1}}{x^2 - 16} \right)$