# Precalculus: Chapter 1 Review

1. Write the equation of the line that passes through the points $(-4,5)$ and $(-3,-1)$.

2. Write the equation for the horizontal line through the point $(-7,3)$.

3. Find the slope – intercept form of the equation of the line through the point $(7,-1)$, perpendicular to the line $-3x+9y=5$.

4. Find $f(-2)$ for the function $f$ given by $f(x)=-3x^3+x^2+6x-2$.

5. When looking at an equation for a function and trying to determine the domain of the function, what are two specific things that can cause problems and restrict the domain?

6. Find the domain for each of the following functions algebraically (SHOW WORK!):

   a. $h(x)=\dfrac{x+3}{x^2+x-6}$ b. $f(x)=\sqrt{2x-5}$

7. Find both the domain and the range for the following function (You may use your calculator):

   $f(x)=2x^2-5$

8. Find any relative maximum values and relative minimum values that exist for the function $y=x^3-3x^2+5$ (You may use your calculator).

9. Using the function from #8, determine the intervals of increase and decrease.

10. Determine whether the function $f$ given $f(x)=x^3-3x^2+5$ by is even, odd, or neither algebraically (SHOW WORK!).

11. Evaluate the difference quotient $\dfrac{f(x+h)-f(x)}{h}$ for the function $f$ given by $f(x)=x^2+3x-2$

12. Find $(f+g)(x)$ and $(f+g)(2)$ for $f(x)=x^2+2x+5$ and $g(x)=-1-2x+x^2$.

13. If $f(x)=3+x$ and $g(x)=x^2-2$ find $(f\circ g)(x)$ and $(g\circ f)(x)$.

14. Verify algebraically that the following functions are inverse functions.

    $f(x)=4x-\frac{2}{3}$ and $g(x)=\frac{1}{4}x+\frac{1}{6}$

15. Explain the relationship between the graphs of a function and its inverse function.

16. What is the test for determining if a function is one-to-one? Why is this test necessary when finding an inverse?

17. Find the inverse function for each of the functions given below:

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

# PRECALCULUS : CHAPTER 1 REVIEW ANSWERS

① $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1-5}{-3-(-4)} = \frac{-6}{1} = -6$

$y = mx + b \quad (-4, 5)$

$5 = (-6)(-4) + b$

$5 = 24 + b$

$-19 = b$

$\boxed{y = -6x - 19}$

② $\boxed{y = 3}$

③ $-3x + 9y = 5$

$9y = 3x + 5$

$y = \frac{1}{3}x + \frac{5}{9}$

$\downarrow$

$m = \frac{1}{3} \quad \perp m = -3$

$y = mx + b \quad (7, -1)$

$-1 = (-3)(7) + b$

$-1 = -21 + b$

$20 = b$

$\boxed{y = -3x + 20}$

④ $f(-2) = -3(-2)^3 + (-2)^2 + 6(-2) - 2$

$\boxed{f(-2) = 14}$

⑤ A) ZEROS IN THE DENOMINATOR
B) NEGATIVES UNDER AN EVEN ROOT

6A) $x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3 \quad x = 2$

DOMAIN: $\mathbb{R}, x \neq -3, x \neq 2$

6B) $2x - 5 \geq 0$

$2x \geq 5$

$x \geq 5/2$

DOMAIN: $x \geq 5/2$

⑦ DOMAIN: $\mathbb{R}$

RANGE: $y \geq -5$

⑧ MINIMUM: 1 when $x = 2$
MAXIMUM: 5 when $x = 0$

⑨ $\nearrow (-\infty, 0) \cup (2, \infty)$
$\searrow (0, 2)$

⑩ $f(x) = x^3 - 3x^2 + 5$

$f(-x) = (-x)^3 - 3(-x)^2 + 5$

$= -x^3 - 3x^2 + 5$

COMPARE

NEITHER, IT'S NOT THE SAME AS $f(x)$ OR OPPOSITE

⑪ $f(x+h) = (x+h)^2 + 3(x+h) - 2$

$= x^2 + 2xh + h^2 + 3x + 3h - 2$

$\frac{f(x+h) - f(x)}{h} = \frac{(x^2 + 2xh + h^2 + 3x + 3h - 2) - (x^2 + 3x - 2)}{h}$

$= \frac{2xh + h^2 + 3h}{h} = \boxed{2x + h + 3}$

⑫ $(f+g)(x) = (x^2 + 2x + 5) + (-1 - 2x + x^2)$

$\boxed{= 2x^2 + 4}$

$(f+g)(2) = 2(2)^2 + 4 = \boxed{12}$

⑬ $(f \circ g)(x) = 3 + (x^2 - 2) = \boxed{1 + x^2}$

$(g \circ f)(x) = (3 + x)^2 - 2 = 9 + 6x + x^2 - 2$

$\boxed{= x^2 + 6x + 7}$

⑭ $(f \circ g)(x) = 4\left(\frac{1}{4}x + \frac{1}{6}\right) - \frac{2}{3}$

$= x + \frac{2}{3} - \frac{2}{3}$

$= x$ ← This means f & g are inverses

⑮ The graph of the inverse function is a reflection of the original function over $y = x$

⑯ Horizontal Line Test

If the graph fails the horizontal line test, it doesn't have an inverse.

17A) $f(x) = (x+4)^3 - 3$

one-to-one: yes

$x = (y+4)^3 - 3$

$x + 3 = (y+4)^3$

$\sqrt[3]{x+3} = y + 4$

$y = \sqrt[3]{x+3} - 4$

$\boxed{f^{-1}(x) = \sqrt[3]{x+3} - 4}$

17B) $g(x) = \frac{-5 + 4x}{-2 + 3x}$

one-to-one: yes

$x = \frac{-5 + 4y}{-2 + 3y}$

$x(-2 + 3y) = -5 + 4y$

$-2x + 3xy = -5 + 4y$

$3xy - 4y = -5 + 2x$

$y(3x - 4) = -5 + 2x$

$y = \frac{-5 + 2x}{3x - 4}$

$\boxed{g^{-1}(x) = \frac{-5 + 2x}{3x - 4}}$