

Name _____

Date _____

Calculus I Honors - OPTIONAL Precalculus Review

Period _____

Find the *zeros* BOTH algebraically AND graphically (use your calculator!). Write your solution(s) as an ordered pair.

1. $y = x^3 - 3x = 0$
 $y = x(x^2 - 3) = 0$
 $x = 0 \quad x^2 - 3 = 0$
 $x = 0 \quad x = \pm\sqrt{3}$

$(0, 0)$
 $(\sqrt{3}, 0)$
 $(-\sqrt{3}, 0)$

2. $y = x^4 + 2x^2 - 3 = 0$
 $y = (x^2 + 3)(x^2 - 1) = 0$
 $x^2 + 3 = 0 \quad x^2 - 1 = 0$
 $x^2 \neq -3 \quad x = \pm 1$

$(-1, 0)$
 $(1, 0)$

Find the point(s) of intersection BOTH algebraically AND graphically (use your calculator!). Write your solution(s) as an ordered pair.

3. $y = x^2 - 4x - 10$
 $y = -x^2 - 2x + 14$
 $x^2 - 4x - 10 = -x^2 - 2x + 14$
 $2x^2 - 2x - 24 = 0$
 $x^2 - x - 12 = 0$
 $(x - 4)(x + 3) = 0$
 $x = 4, -3$
 $x = 4$
 $y = 4^2 - 4(4) - 10 = -10$
 $(4, -10)$
 $x = -3$
 $y = (-3)^2 - 4(-3) - 10 = 11$
 $(-3, 11)$

4. $x + y = 2 \Rightarrow y = 2 - x$
 $y = x^2 - 4$
 $x^2 - 4 = 2 - x$
 $x^2 + x - 6 = 0$
 $(x + 3)(x - 2) = 0$
 $x = -3, 2$
 $x = -3$
 $-3 + y = 2$
 $y = 5$
 $(-3, 5)$
 $x = 2$
 $2 + y = 2$
 $y = 0$
 $(2, 0)$

Find an equation of the line that passes through the point $(2, -5)$ and is:

5. parallel to $2x - y = 6 \Rightarrow y = 2x - 6$
 $m_{||} = 2$

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

6. perpendicular to $2x - y = 6 \Rightarrow y = 2x - 6$
 $m_{\perp} = -\frac{1}{2}$

$y + 5 = -\frac{1}{2}(x - 2)$

7. has an undefined slope
vert. line
 $x = 2$

8. has zero slope
horiz. line
 $y = 2$

Find the domain for each of the following. Write your answer in interval notation.

9. $y = \sqrt{x^2 - 9}$
 $x^2 - 9 \geq 0$
 $(x + 3)(x - 3) \geq 0$
 $x = \pm 3$
 $(-\infty, -3] \cup [3, \infty)$

10. $y = \frac{1}{3x - 1}$
 $3x - 1 \neq 0$
 $x \neq \frac{1}{3}$
 $(-\infty, \frac{1}{3}) \cup (\frac{1}{3}, \infty)$

11. $y = \frac{x + 2}{\sqrt{x + 5}}$
 $(-5, \infty)$
 $\sqrt{x + 5} > 0$
 $x + 5 > 0$
 $x > -5$

Given: $f(x) = 2x^2 - 1$ and $g(x) = \sqrt{x - 1}$; find each of the following:

12. $f \circ g(x)$
 $= f(g(x)) = f(\sqrt{x - 1})$
 $= 2(\sqrt{x - 1})^2 - 1 = 2(x - 1) - 1$
 $= 2x - 2 - 1$
 $= 2x - 3$

13. $f(3)$
 $f(3) = 2(3)^2 - 1$
 $= 2(9) - 1$
 $= 17$

14. $g(f(-1))$
 $f(-1) = 2(-1)^2 - 1 = 1$
 $g(1) = \sqrt{1 - 1} = 0$

Evaluate the piecewise function.

$$f(x) = \begin{cases} x+3; & x < 0 \\ x^3-1; & 0 \leq x < 1 \\ x^2; & x \geq 1 \end{cases}$$

15. $f(4) = 4^2 = 16$

16. $f(0) = 0^3 - 1 = -1$

17. $f(0.5) = \left(\frac{1}{2}\right)^3 - 1 = \frac{1}{8} - 1 = -\frac{7}{8} = -.875$

18. $f(-1) = -1 + 3 = 2$

Simplify.

19.
$$\frac{4x^2+x-6}{x^2+3x+2} - \frac{3x}{x+1} + \frac{5}{x+2}$$

$$= \frac{4x^2+x-6 - 3x(x+2) + 5(x+1)}{(x+2)(x+1)}$$

$$= \frac{4x^2+x-6 - 3x^2-6x+5x+5}{(x+2)(x+1)}$$

$$= \frac{x^2-5x-1}{(x+2)(x+1)}$$

$$= \frac{x^2-5x-1}{(x+2)(x+1)}$$

20.
$$\frac{3x^2-8x+4}{2x^2+5x+2} \div \frac{4-x^2}{2x^2+11x+5}$$

$$= \frac{(3x-2)(x-2)}{(2x+1)(x+2)} \cdot \frac{(2x+1)(x+5)}{(2-x)(2+x)}$$

$$= \frac{-(3x-2)(x+5)}{(x+2)^2}$$

Solve:

21. $9x^2 - 11 = 6x$

$$9x^2 - 6x - 11 = 0$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(9)(-11)}}{2(9)}$$

$$x = \frac{6 \pm \sqrt{432}}{18} = \frac{6 \pm 6 \cdot 2\sqrt{3}}{18}$$

$$x = \frac{6 \pm 12\sqrt{3}}{18} = \frac{1 \pm 2\sqrt{3}}{3}$$

22. $x^3 + 3x^2 = 40x$

$$x^3 + 3x^2 - 40x = 0$$

$$x(x^2 + 3x - 40) = 0$$

$$x(x+8)(x-5) = 0$$

$$x = 0, -8, 5$$

Given $y = f(x)$ below. Graph each of the transformations on the same set of axes. Clearly label each transformed graph.

23. $f(x+1) - 2$ shift left 1, down 2

24. $-f(x)$ Reflect in x axis

