Precalculus Winter Packet

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Precalculus Winter Packet

Name:_____ **Precalculus**

Date:_____ **Family:**_____

International Leadership Charter High School

1) What is the domain of the function $f(x) = \sqrt{1 + x}$? **(5 points)**

Domain: _____

2) Does $y = \sqrt{x + 5}$ represent *y* as a function of x? Explain. **(10 points)**

3) Evaluate $q(t) = \frac{2t^2+3}{t^2}$ at t = 0. **(5 points)**

4) Find the domain of $f(x) = \frac{10}{x^2 + 2x}$. **(10 points)**

Domain: _____

5) Given $f(x) = [\![x]\!]$, in what interval does $f(x) = -4$? **(5 points)**

Interval: _____

6) Find the domain of $f(x) = \frac{3}{\sqrt{x-4}}$. **(5 points)**

Domain:_____

7) Explain how the graph of g is obtained from the graph of f. **(5 points)**

$f(x) = \sqrt{x}, \quad g(x) = \frac{1}{2}\sqrt{x-2}$

8) Given $f(x) = x^2 + 2x \; and \; g(x) = 3x^2 - 1$, find $f - g$ and its domain. **(10 points)**

9) Given $f(x) = \frac{2}{x} \; and \; g(x) = \frac{4}{x+4}$, find $f + g$ and its domain. **(10 points)**

10) Given $f(x) = x^3 + 2 \; and \; g(x) = \sqrt[3]{x}$, find $f \circ g$ and its domain. **(10 points)**

11) Find the inverse of $f(x) = \sqrt{2 + 5x}$. **(25 points)**

12) Find the vertex of the parabola $f(x) = -2x^2 - 4x + 1$. **(10 points)**

13) Find the standard form of the equation of the parabola that has vertex $(1, -2)$ and passes through the point $(3, 6)$. **(10 points)**

14) Given $y = f(x) = (x - 4)^2 + 5, what\ is\ the\ minimum\ value\ of\ y?$ **(5 points)**

15) Describe the right-hand and left-hand behavior of the graph of each function. **(10 points)**

(a) $f(x) = -x^4 + 7x^3 - 14x - 9$

(b) $g(x) = 5x^5 + 2x^3 - 10x^2 + 6$

16) Find all the real zeros of the polynomial function. Determine the multiplicity of each zero.

(a) $f(x) = x^2 + 10x + 25$ **(5 points)**

(b) $f(x) = x^4 - x^3 - 20x^2$ **(15 points)**

17) Given $P(x) = 2x^4 - x^3 + 9x^2$ and $D(x) = x^2 + 4$, use long division to divide $P(x)$ by $D(x)$, and express the quotient as $\frac{P(x)}{D(x)} = Q(x) + \frac{R(x)}{D(x)}$. **(15 points)**

18) Let $P(x) = x^3 - 7x + 6$. Show that $P(1) = 0$, and use this fact to factor $P(x)$ completely. **(15 points)**

19) Find a polynomial $P(x)$ of degree 3 that has zeros $-3, 1, and\ 5$. **(15 points)**

20) Use the **Rational Zeros Test** to list all possible rational zeros of f. Find the rational zeros. **(15 points)**

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

21) Use **Descartes' Rule of Signs** to determine the possible number of positive and negative real zeros of the function. **(10 points)**

$f(x) = 2x^4 - x^3 + 6x^2 - x + 5$

22) Express the following in the form a + bi. **(10 points)**

(a) $(11 - 2i) - (-3 + 6i)$ (b) $(7 + 6i) + (3 - 12i)$

23) Express the following in the form a + bi. **(10 points)**

(a) $(1 + 6i)(5 - 2i)$ (b) $i^{131} =$

24) Express the following in the form a + bi. **(10 points)**

$\frac{8+5i}{6-i}$

25) Perform the operations and write the result in standard form. **(10 points)**

$i(6+i)(3-2i)$