

# Niagara Falls High School Precalculus 2020 Review Work

**Directions:** Answer all of the following questions. Show all work on this paper. Each question is worth 4 points.

1.) Evaluate each of the following limits:

a.)  $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x - 3}$

b.)  $\lim_{x \rightarrow \infty} \frac{3x^2 + x - 1}{x^2 - 1}$

2.) Prove:  $f(x)$  is a *one-to-one function*.  $f(x) = \frac{x}{x-3}$

3.) Determine  $k$  so that  $P(x) = kx^4 - 3x^3 + 2k - 5$  is divisible by  $x - 1$ .

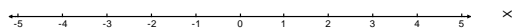
4.) Using the *Rational Roots Theorem*, list all possible rational zeros for:  $P(x) = 3x^4 + 2x - 5$

5.) Use *synthetic division* to find  $P(-1)$  for  $P(x) = 2x^4 - x + 3$ .

6.) Find any vertical, horizontal or slant asymptotes:  $f(x) = \frac{3x^2 - 2x + 4}{x - 3}$

7.) The half-life of radium is 1690 years. Write an *exponential function* of the form:  $C(t) = C_0 e^{kt}$  to model the amount of radium  $C(t)$  left after  $t$  years, starting with an initial population of  $C_0$ .

8.) a. Sketch the graph of all values of  $x$ , whose distance from  $1$  is *greater than 3*.  
b. Using absolute value symbols, write an equality to represent this set.



9.) The wheel of a bike has a radius of  $1 \text{ ft}$ . If the wheel turns at a rate of 9 revolutions per second, find the *speed* of the bike in **miles/hour**. Note: 1 mile = 5280 ft.

10.) Solve for  $x$ :  $\ln(7 - x) + \ln(3x + 5) = \ln(24x)$

11.) Write an expression for:  $\csc(\arccos x)$ .

12.) Find the **center and foci** of the ellipse:  $9x^2 + 4y^2 - 36x - 24y - 36 = 0$ .

13.) Use *Mathematical Induction* to prove:  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$ .

14.) Write as a sum of *partial fractions*:  $\frac{3x+2}{x^2-5x+6}$ .

15.) Convert from rectangular to *polar* coordinates:  $(5\sqrt{2}, -5\sqrt{2})$ .

16.) Find a formula for the sum of the first  $n$  terms of the arithmetic sequence with:  $a_1 = 5$  and  $d = -4$ .

Assume  $n$  begins with 1.

17.) Evaluate:  $\sum_{n=0}^{\infty} 2\left(\frac{1}{2}\right)^n$

18.) Sketch, by hand, the graph of:  $y = 2\sin(2x - \pi) - 1$ . Name: the **period, beginning, middle** and **end**.

Period: \_\_\_\_\_ Begin:  $x =$  \_\_\_\_\_ Mid:  $x =$  \_\_\_\_\_ End:  $x =$  \_\_\_\_\_