

Name _____ Date _____ Period _____

Calculus Prerequisites

Worksheet—Day 1

Work the following on notebook paper. All work must be shown. Use your **calculator only on problems 14-17 and problems 30-32**.

Find the equations of the asymptotes (horizontal, vertical, and slant), symmetry, and intercepts, then sketch the graph.

5. $y = \frac{2x^2 - 8}{x^2 - 16}$

6. $y = \frac{x^2 - 2x - 3}{x + 2}$

Solve.

7. $(x+1)(x-3)^3(x+2)^2 \geq 0$

8. $\frac{4x-3}{x+1} < 0$

Solve. Show all steps. Give decimal answers correct to **three** decimal places.

14. $e^{2x} - e^x - 12 = 0$

15. $\log_3(x+4) - \log_3(x-1) = 2$

16. $\log_2(\log_3(\log_5 x)) = 0$

17. The number of junior and senior students at NBHS infected with the “Math Bug” t days after exposure

is modeled by the function $P(t) = \frac{500}{1 + 3^{3-t}}$.

- How many students were originally infected?
- How many of these students were infected after four days?
- When will 200 of these students be infected?
- What is the maximum number of students that will be infected?

Evaluate.

18. $\cos\left(\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$

19. $\tan(\text{Arc sec}(3x))$

20. Convert $r^2 + 6r \cos \theta = 0$ into rectangular form.

21. Sketch the graph of $r = 2 + 2 \sin \theta$.

22. Sketch the graph of $r = 1 - 2 \cos \theta$.

Find the limit.

23.
$$\lim_{x \rightarrow 3} \frac{x-3}{x^3-27}$$

24.
$$\lim_{y \rightarrow 0} \frac{\sqrt{2-y} - \sqrt{2}}{y}$$

25.
$$\lim_{x \rightarrow -\infty} \frac{3x^2 - 4x^3}{5x^3 + 2x}$$

Use the power rule to find the derivative when needed.

26. Find the slope of the line tangent to $f(x) = x^3 - 3x^2 + 4x$ at the point $(1, 2)$.27. Find an equation of a line that is tangent to $g(x) = 5 - x^2$ and is perpendicular to the line $x + 6y - 7 = 0$

Use the limit definition of the derivative to find the derivative of each function.

28.
$$f(x) = \frac{2}{x+1}$$

29.
$$f(x) = -2\sqrt{x+1}$$

Write a function, and use your graphing calculator to solve. Give decimal answers correct to **three** decimal places.

30. A container with a square base, vertical sides, and an open top is to be made from 1000 ft^2 of material (assume no waste.) Find the dimensions of the container with greatest volume.

31. A piece of wire 10 m long is cut into two pieces. One piece is bent into a square, and the other is bent into an equilateral triangle. How should the wire be cut so that the total area enclosed is

- A maximum?

- A minimum?

32. On the same side of a straight river are two towns, and the townspeople want to build a pumping station at point S . Find the distance from S to Town 1 that will minimize the total length of pipe.

