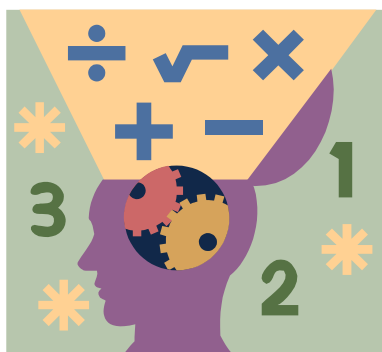Name_____

For students entering
AP Calculus AB/BC
in September 2022

Summer is a time to relax and have fun, and we hope that you enjoy it! We also would like to give you the opportunity to review and reinforce your math skills to avoid "brain drain" this summer. We have created this work packet so that you focus your review in the most important areas of mathematics from the course you completed this year. Please set aside some time each week to keep your skills sharp. This packet will be completed and reviewed as a portion of the initial homework assignments given in September.
Use your notebook or the following internet sites as resources.

LOOKING FOR SOME HELP ? TRY THESE INTERNET RESOURCES.
www.Teachertube.com
www.purplemath.com
www.youtube.com/mathdoris
www.khanacademy.org

Please **SHOW ALL WORK** for each problem on separate paper to receive full credit. Check your final solutions by referring to the answer key posted on the school website. Your work will be reviewed on the first day in second rotation that your class meets.

Please also complete the self-reflection form found at https://goo.gl/forms/MSdXo8CrFIZiZ2Lp2

Please be honest about your own mastery of the pre-requisite skills for Calculus.

Name : _____

Directions: Place all answers on the answer sheet attached. All support work **must be attached** and clearly labeled with the problem number in chronological order.

SKETCHING:
For each function below, make an accurate sketch WITHOUT the use of a graphing calculator. Be sure to use at least three key points and state the domain, range, asymptotes (if any), and zeros. Grids are attached at the end of the packet.

1. $y = 4x - x^2$

2. $f(x) = 2^{-x} + 3$

3. $f(x) = \dfrac{x+3}{x^2 - 9}$

4. $f(s) = \sqrt{s-4}$

5. $f(t) = (t-4)^{\frac{2}{3}}$

6. $f(x) = \begin{cases} |x|, & x \le 2 \\ 3-x, & x > 2 \end{cases}$

7. $f(x) = \ln(x+1)$

8. $f(x) = e^x$

9. $f(x) = \arctan x$

10. $f(\theta) = -\cos 2\theta$

SOLVE ALGEBRAICALLY:
For problems 11 – 16, ALGEBRAICALLY solve each equation for the missing variable.

11. $e^{2x} - 4e^x + 3 = 0$

12. $\log_2 x + \log_2(x-7) = 3$

13. $3\ln(2x) = 12$

14. $3^x + 1 = 5$

15. $2\sin x \cos x = -\sin x$ for x in the domain $[0, 2\pi)$.

16. $|3x - 4| \le 2$

SIMPLIFY COMPLETELY:
For problems 17 – 23, simplify COMPLETELY. Justify ALL answers.

17. $\dfrac{\sin^2(15) + \cos^2(15)}{\sin\left(\dfrac{\pi}{6}\right)\sec\left(\dfrac{\pi}{3}\right)}$

18. $\dfrac{\dfrac{1}{x} - \dfrac{1}{x-1}}{1 - \dfrac{1}{x}}$

19. $\dfrac{\dfrac{x^2-1}{3x+2}}{\dfrac{x+1}{3x^2-x-2}}$

20. $2[3\ln x - \ln(x+1) - \ln(x-1)]$

21. $\ln\dfrac{\sqrt{x}y^4}{z^4}$

22. $\dfrac{2x^{\frac{1}{3}}\left(3x^{\frac{1}{3}} - 4x^{\frac{4}{3}}\right)}{2x^{-\frac{1}{3}}}$

23. a. $\ln\dfrac{1}{\sqrt{e}}$

   b. $e^{2\ln x}$

   c. $\log_{27} 9$

25. Use long division to divide $\dfrac{x^2}{x^2+1}$.

FACTORING:
For problems 27-31, factor as indicated. Rewrite with positive exponents, if necessary. Record your final solutions on the answer sheet.

27. $81x^4 - 16$

28. $e^{-x} - xe^{-x} + 2x^2 e^{-x}$

29. $(x-3)^3(x+2) - 2(x-3)^2(x+2)^2$

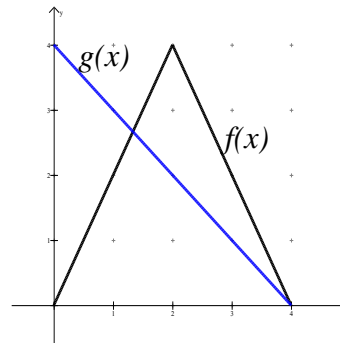30. $6x^2 + 13x - 5$

31. $2\sqrt{x} + 6x^{3/2} = 2\sqrt{x}(\underline{\hspace{2cm}})$

FUNCTIONS:

32. If $f(x) = \dfrac{1}{x}$, find the simplified formula for the difference quotient $\dfrac{f(x+h) - f(x)}{h}$.

For questions 33 – 35, use the given graph of functions $f(x)$ and $g(x)$ to answer the following questions.

33. $f(g(2))$
34. $g(f(2))$
35. $f^{-1}(4) + g^{-1}(3)$

36. Sketch the graph of the rational function below WITHOUT TECHNOLOGY. Be sure to state the domain, range, horizontal and vertical asymptotes, and the coordinates of any hole(s). CAREFULLY sketch and provide a minimum of 4 coordinates clearly labeled on your graph.

$$f(x) = \frac{x^2 - 1}{x^2 + 2x - 3}$$

Use the graph of the rational function to determine the following limits.

a. $\displaystyle\lim_{x \to 3} f(x)$

b. $\displaystyle\lim_{x \to 1} f(x)$

c. $\displaystyle\lim_{x \to -3^-} f(x)$

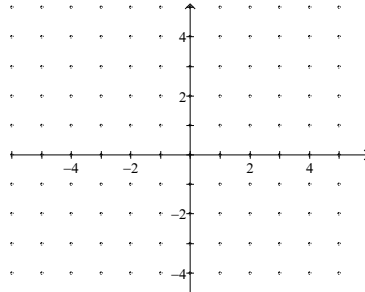d. $\displaystyle\lim_{x \to -3^+} f(x)$

e. $\displaystyle\lim_{x \to \infty} f(x)$
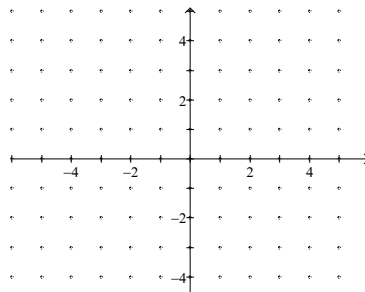
Name: _____ Class: _____
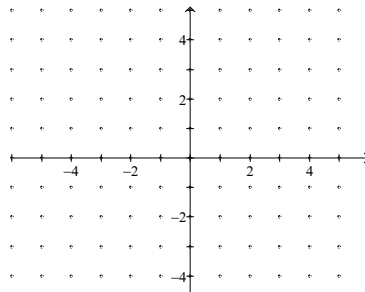
ANSWER SHEET

1. Domain: _____

   Range: _____

   Zeros: _____

   Asymptotes: _____
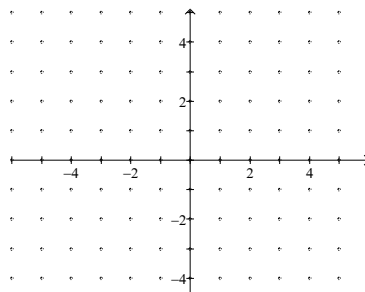
2. Domain: _____

   Range: _____

   Zeros: _____

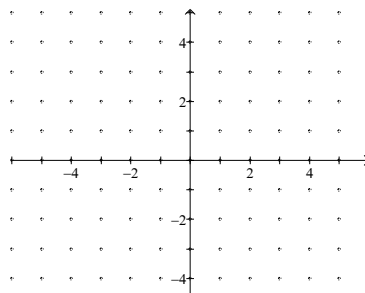   Asymptotes: _____

3. Domain: _____

   Range: _____

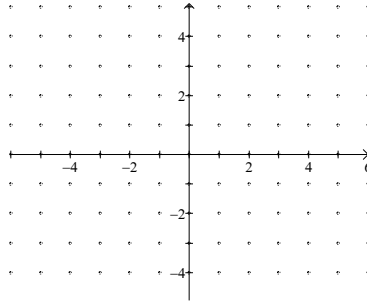   Zeros: _____

   Asymptotes: _____

4. Domain: _____

   Range: _____
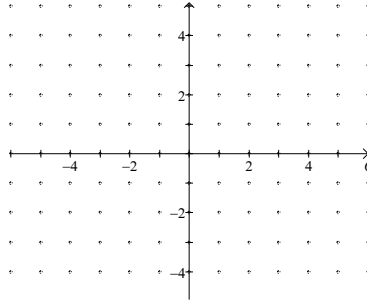
   Zeros: _____

   Asymptotes: _____

5. Domain: _____

   Range: _____

   Zeros: _____
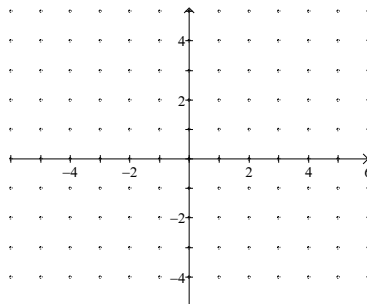
   Asymptotes: _____

6. Domain: _____

   Range: _____

   Zeros: _____
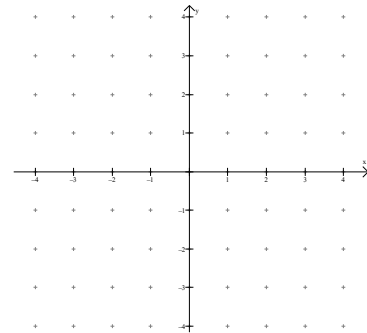
   Asymptotes: _____

7. Domain: _____

   Range: _____

   Zeros: _____

   Asymptotes: _____

8. Domain: _____

   Range: _____

   Zeros: _____

   Asymptotes: _____

9. Domain: _____

   Range: _____

   Zeros: _____

   Asymptotes: _____

10. Domain: _____

    Range: _____

    Zeros: _____

    Asymptotes: _____