

Dear Future Calculus AB Student,

Summer 2022

Welcome to the wonderful world of AP Calculus! Your first responsibility in signing up for this class is to make sure that your math skills, in all areas, are extremely strong. The purpose of this packet is for you to “work out” this summer and refresh/relearn your skills. Just as sports teams have weeks of training sessions before starting a season, so must you train before stepping into your first Calculus lesson. Once you start working with Calculus concepts, your energy needs to be spent focusing on mastering **those** skills, not going back to remember how to factor an expression, solve a polynomial inequality, or find trig function values from the unit circle.

Over the summer, we are SUGGESTING that you complete this packet. It is OPTIONAL. However, it would be a good way to refresh your skills prior to coming back to school. If you would like to see the answer key to check any of your answers, email Mrs. Willenbrock and she will send it to you.

If you have questions, you may email Mrs. Willenbrock at tara.willenbrock@fcps.edu or Mr. Wultors at scwultors@fcps.edu.

Have a great summer! We look forward to working with you in the fall!

Mrs. Willenbrock

Mr. Wultors

Directions: Work the following problems, showing all related work neatly. Use extra paper if necessary.

Only use a calculator on the calculator section.

1. Solve for x $3[4x - 2(3x - 1)] = 7 - 9x$	2. Solve for x $\frac{2x-3}{5} - \frac{6x+1}{2} = \frac{-3}{10}$	3. Solve for x $\frac{5}{2x+1} + \frac{2}{x-1} = \frac{12}{2x^2-x-1}$
4. Solve for y: $x = \frac{5y-3}{2y+1}$	5. Solve for y': $2xy' + 2y + 1 = 12 - y'$	6. Solve for x $4x^2 + 4x - 3 = 0$
7. Solve for x $\frac{3x^2-5x-2}{x+4} = 0$	8. Simplify $5x^3(2x)^4(3x^{-2})$	9. Simplify $\left(\frac{4x^4}{y^6}\right)^{-\frac{3}{2}}$

<p>10. Solve for x (hint...number line??)</p> $(x - 4)(x - 1)(3x + 5)^2 > 0$	<p>11. Find values of x where the function below is undefined.</p> $h(x) = \frac{2x-6}{x^2+3x-4}$	<p>12. Solve for x (hint...number line??)</p> $\frac{2x-6}{x^2+3x-4} \leq 0$
<p>13. Simplify</p> $\frac{x^2 - 7x + 10}{x^2 - 1} \cdot \frac{x + 1}{x - 5}$	<p>14. Factor completely</p> $2x^5 - 6x^3 - 8x$	<p>15. Factor completely</p> $2x(4x + 3)^3 - 5(4x + 3)^4$
<p>16. If $f(x) = \frac{x^2}{2} - \ln x$, then $f(e) - f(1) =$</p>	<p>17. If $f(x) = 3\sqrt{x}$ and $f(k) - f(4) = 1$, then $k =$</p>	<p>18. If $V = \frac{1}{3}\pi r^2 h$ and $r = \frac{1}{4}h$ then $V(h) =$</p>

19-21 Given $f(x) = 2x - 1$, $g(x) = 3x^2$, $f'(x) = 2$, and $g'(x) = 6x$, find the following

19. $(g(f(x))) \cdot g'(x)$	20. $f(x)g'(x) + f'(x)g(x)$	21. $\frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$
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22. If $f(x) = \frac{x-3}{x^2-8x+15}$, find the vertical and horizontal asymptotes.

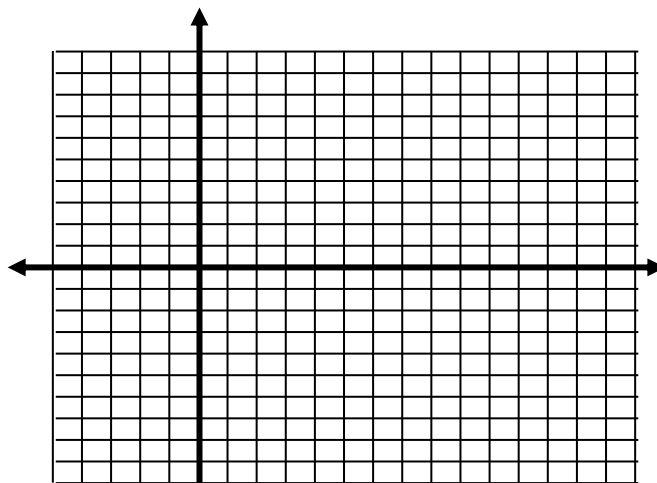
33. Graph $f(x) = e^x - 3$ and find the following:

Domain: _____

Range: _____

Asymptote(s): $\lim_{x \rightarrow -\infty} f(x) =$

Solve: $e^x - 3 < 0$?



24. Graph $f(x) = \ln(x - 2)$, find the following:

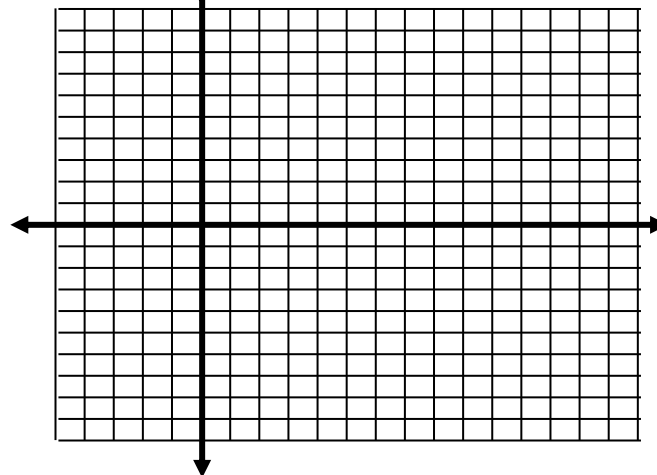
Domain: _____

Range: _____

Asymptote(s): _____

$\lim_{x \rightarrow \infty} f(x) =$

Solve: $\ln(x - 2) > 0$



Solve the following equations for x. Make sure to give exact values. No decimals!! NO CALCULATORS!!

25. $e^{3x} = 8$	26. $\ln(x + 2) = 5$	27. $\ln 2 + \ln(x - 2) = 7$
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Find the exact value of the following using the unit circle.

28. $\cos\left(\frac{2\pi}{3}\right) =$

29. $\tan\left(\frac{\pi}{4}\right) =$

30. $\sin\left(\frac{7\pi}{6}\right) =$

31. $\tan\left(\frac{3\pi}{2}\right) =$

32. $\cos\left(\frac{-\pi}{6}\right) =$

33. $\cos\left(\frac{\pi}{2}\right) =$

34. $\tan\left(\frac{\pi}{3}\right) =$

35. $\sin\left(\frac{\pi}{4}\right) =$

36. $\sin\left(\frac{-\pi}{3}\right) =$

WATCH RESTRICTIONS ON THESE

37. $\arcsin(-1)$

38. $\arctan(1)$

39. $\arccos\left(\frac{-1}{2}\right)$

Solve each equation for solutions in the interval $[0, 2\pi)$

40. $(\sin \theta + 1)(2 \sin \theta + 1) = 0$

41. $\cos x \tan x - \tan x = 0$

42. Find the equation of the line through the points (4, 3) and (-7, 3).

43. Find the equation of the line perpendicular to $5x + 2y = 1$ that passes through (5, 7)

44. Find the equation of the line parallel to $x - 2y = 5$ that passes through $(-4, 1)$.

45. Find the equation of the line parallel to the y axis for which $f(4) = 6$.

CALCULATOR SECTION. Use your calculator to help you answer the following questions.

46. a. Solve for x : $2x^3 + 3x = 1$

b. Use above value of x to evaluate $f(x) = \frac{x^4}{2} + \frac{3x^2}{2}$

47. Find where $x \cos x > 0$ on the interval $[0, 5]$

48. Find all **points** of intersection of $f(x) = x^2$ and $g(x) = 2^x$ (Include **at least** 3 decimal places in your answer.)

49. Find all intervals where $2x^2 - 10x + e^x < 0$. (Again, include **at least** 3 decimal places in your answer.)

50. On the interval $(-4, 1)$, at what value(s) of x does $f(x) = \ln(x^4 + 5x^3 + x^2 - 7x + 28)$ change from negative to positive.

51. If $f(t) = \frac{5e^{-3t} + 2}{t \sin t}$, then $f(2) =$