Name _____ **Due: Wednesday, September 3rd**

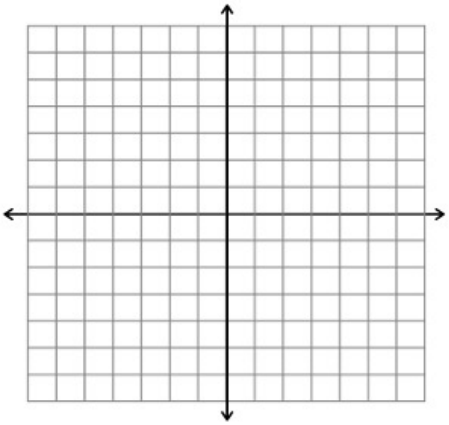
Calculus Honors Summer Assignment

You are responsible to know all the material on this review upon entering Calculus Honors. You should use your notes from previous math courses and additional resources to make sure it is completed fully and correctly. You will be ***assessed*** *on this material within the first few weeks of the school year.*

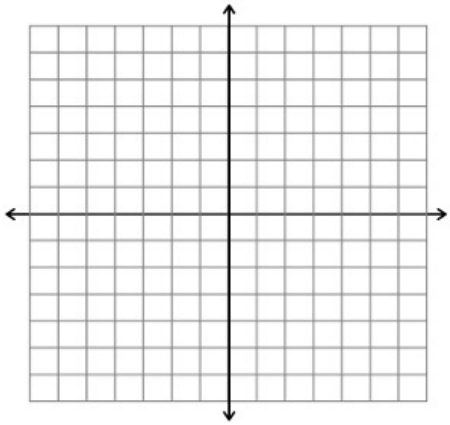
Complete all questions **without a calculator**.

1. Graph each rational function.

a) $f(x) = \frac{2x+4}{x^2-2x-8}$

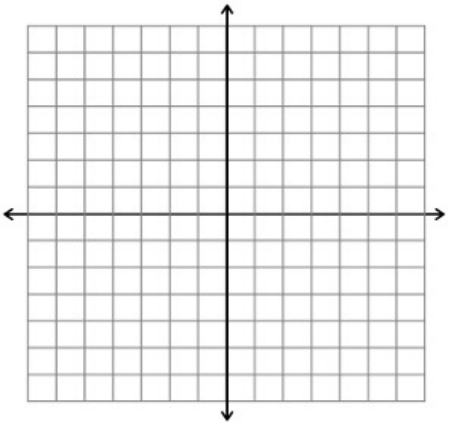


b) $f(x) = \frac{x^2+1}{x-1}$

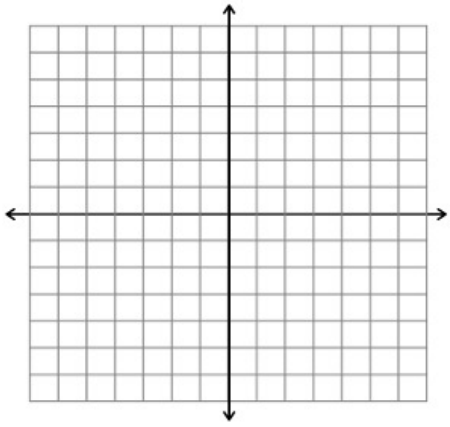


2. Graph each exponential function.

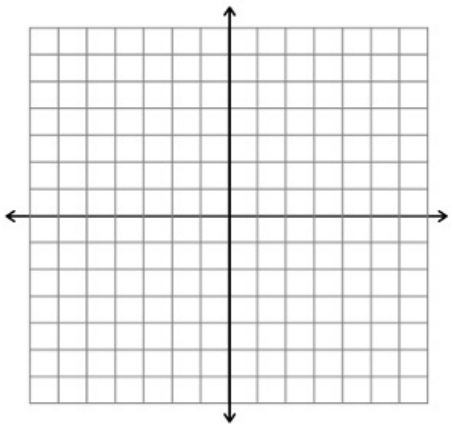
a) $y = 2^{x-2} - 5$



b) $g(x) = 3\left(\frac{1}{2}\right)^x$



3. Graph the equation $y = x^3 - x$ and answer the following questions.

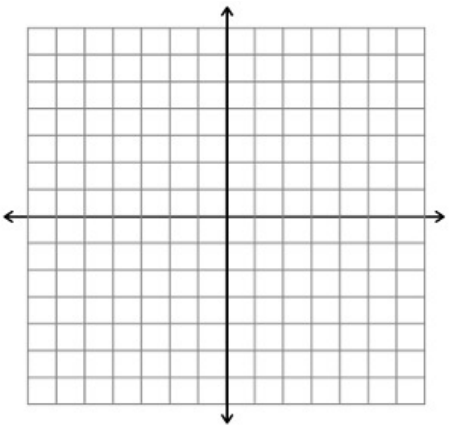


What is the y-intercept?

What are the x-intercepts?

4. Graph the following piecewise function.

$$f(x) = \begin{cases} 2x & (-\infty, -1) \\ 2x^2 & [-1, 2) \\ -x + 3 & (2, \infty) \end{cases}$$



5. If $f(x) = x^2 - 1$, describe in words what the following would do to the graph of $f(x)$.

a) $f(x) - 4$ b) $f(x - 4)$ c) $-5f(x)$

6. Write the equation of the line containing $(1, 5)$ and $(4, 3)$.

7. Write the equation of the line perpendicular to $3x - y = -4$ and through the point $(6, -1)$.

8. Evaluate.

a) $\ln 1$ b) $\sin 0$ c) $\tan\frac{\pi}{2}$

d) $27^{2/3}$ e) $\sec 2\pi$ f) $e^{\ln 4}$

g) $\cos 0$ h) $\ln e^5$ i) 2^{-3}

j) $81^{-1/4}$ k) $\sin\frac{\pi}{2}$ l) $\cos\frac{\pi}{4}$

m) $\ln e$ n) $\ln 0$ o) $\sin\pi$

p) $\sin\frac{11\pi}{6}$ q) $\cos\left(-\frac{\pi}{3}\right)$ r) $\cot\frac{9\pi}{4}$

9. Solve over the interval $0 \leq x < 2\pi$.

a) $2\sin^2\theta = 1 - \sin\theta$ b) $2\tan\theta - \sec^2\theta = 0$

10. Solve each equation.

a) $4x^2 - 21x - 18 = 0$

b) $\ln(x + 5) = \ln(x - 1) - \ln(x + 1)$

c) $\log x + \log(x - 3) = 1$

d) $2x^2 - 3x + 3 = 0$

e) $x^4 - 9x^2 + 8 = 0$

f) $\ln 1 - \ln e = x$

11. Factor the following completely.

a) $2x^2y - 19xy - 33y$

b) $x^3 + 8x^2 + 9x + 72$

c) $a^3 - 27$

d) $32x^6 - 18x^4y^2$

e) $(x+2)^{7/2} - (x+2)^{3/2}$

f) $(3n+1)(4n+1)^2 + (n-5)(4n+1)$

12. Condense the logarithmic expression into a single logarithm.

$\frac{1}{2}\log_7(81y^{12}) - \log_7(3) + \log_7(2y^2)$

13. Expand each logarithmic expression.

a) $\log_6\left(\frac{36m^3}{\sqrt{n}}\right)$

b) $\ln\frac{x^2-1}{\sqrt{x+4}}$

14. If $f(a) = a^2$, simplify $\frac{f(x+h)-f(x)}{h}$.

15. Simplify each expression.

a) $\frac{6x^4y-2xy^4}{2xy}$

b) $\frac{2x^2-3x-9}{x-3}$

c) $\frac{(-2+a)^2-(-2)^2}{a}$

d) $\frac{9-x}{3-\sqrt{x}}$

e) $\frac{\frac{1}{x}-\frac{1}{2}}{x-2}$

f) $\frac{4x^3(5x-2)^3-15(x^4-5)(5x-2)^2}{(5x-2)^6}$

16. Find the points of intersection of the graphs of $y = x^2 - 4x + 3$ and $y = -x^2 + 2x + 3$.