Name: _____   Date: _____

AP CALCULUS BC
Unit 1 study guide

Show your work. Remember: 3 decimal places, rounded or truncated.
No calculator

1. Find the slope of the line through (-3, 4) and (-8, 1).

2. Write the *slope-intercept form* of the equation of a line which passes through the point (-2, -3) and is perpendicular to the line $3x - 5y = 1$.

3. Given the function $f(x) = -2 + \sqrt{1-x}$, find the

   a) domain   b) range

4. Determine algebraically (<u>not</u> graphically) whether the function $f(x) = \dfrac{x^4 + 1}{x^3 - 2x}$ is even, odd, or
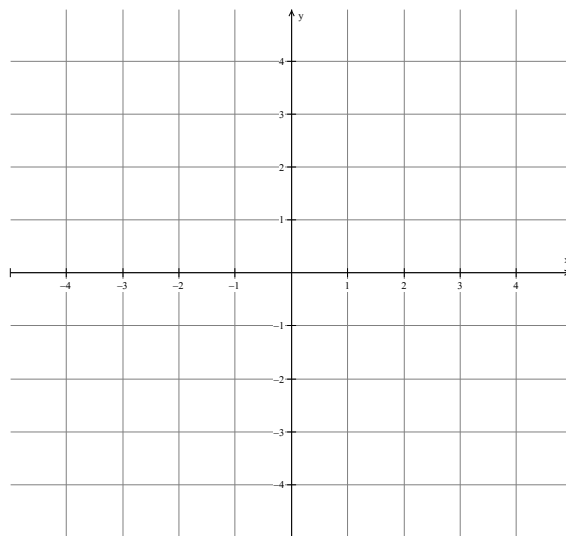
   neither.

5. Sketch the graph of the piecewise function

$$y = \begin{cases} \sqrt{-x}, & -4 \le x \le 0 \\ \frac{1}{2}x+1, & 0 < x \le 4 \end{cases}$$ on the given axes.

6. Given the function $f(x) = \dfrac{2x-1}{3x+4}$, find $f^{-1}(x)$.

7. Simplify the following:

a) $\dfrac{x^2-16}{2x^2-x} \div \dfrac{x+4}{2x^2-3x-2}$

b) $\dfrac{\dfrac{x}{x+1}+\dfrac{x-2}{x+2}}{\dfrac{4x-3}{x^2+3x+2}}$

8. Let $y = \frac{1}{2}\cos\left(\frac{\pi}{2}x\right) - 1$. Without graphing the function, find its

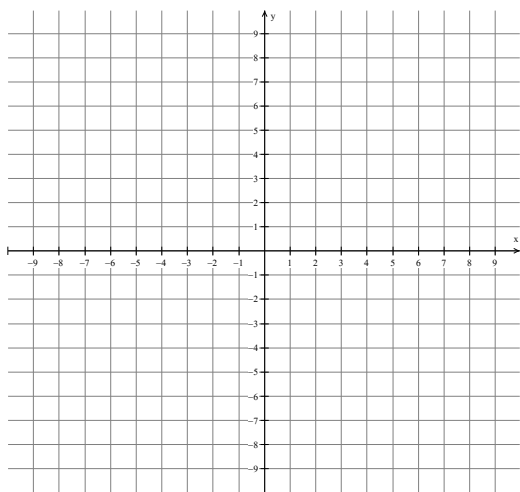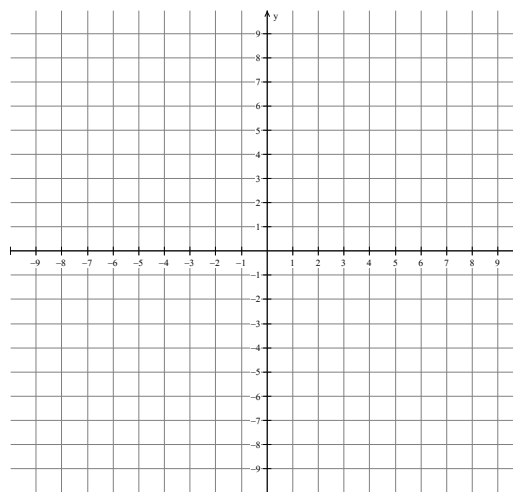   a) amplitude   b) period   c) domain   d) range

9. Sketch the graphs of the function and its given transformation. Label three points on each graph.

a) $f(x) = \left(\frac{1}{2}\right)^x$

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

10. Solve the following equation for x.

$$\log_2(x+7) + \log_2(x+8) = 1$$

Calculator allowed.

11. If $f(x) = 2 - x$ and $g(x) = \sqrt{1-x}$, find

    a) $(f \circ g)(-1)$ b) $g(f(4))$

12. The number of guppies in Susan's aquarium doubles every day. There are four guppies initially.

    a) Write the number of guppies as a function of time t.

    b) How many guppies were present after one week? Find your answer algebraically.

    c) When will there be 2000 guppies? Solve algebraically.

13. The function $0 = \sin(2x)\ln(3x) - 2$ has many solutions. Use your calculator to graph the function and find one of the solutions in the domain $[0, 10]$.