Math 230 Calculus 1/Precalc Fall 11 Sample midterm 1

(1) Plot the points $(-4, 3)$ and $(3, -2)$ on the grid below, adn draw the straight line through the two points. Find the equation of the straight line.

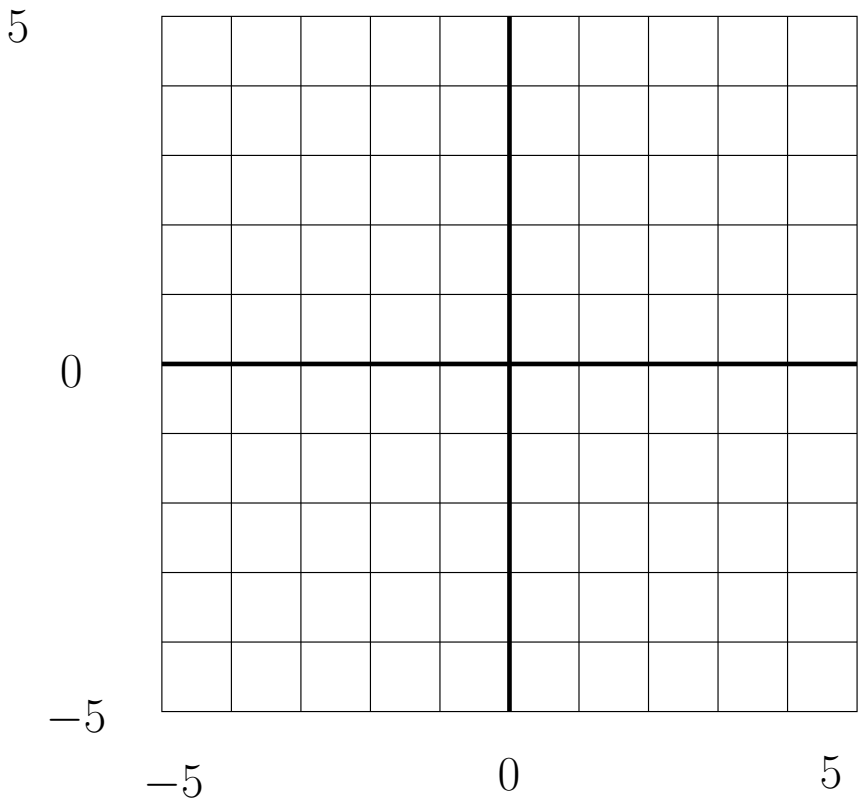

FIGURE 1

(2) What interval corresponds to $|3x - 4| \leq 12$?

(3) Find $\cos^{-1}(\cos(37\pi/3))$.

(4) Find $\sin 2\theta$ if $\sin\theta = 2/5$.

(5) Find $\sin(\cos^{-1}(x))$.

(6) A population of bacteria grows according to the equation $B(t) = 12(1.17)^t$, where t is in hours. How long does it take to double?

(7) The graph of $y = f(x)$ is shown below. Evaluate each limit, or write DNE if the limit does not exist. No justifications are necessary.

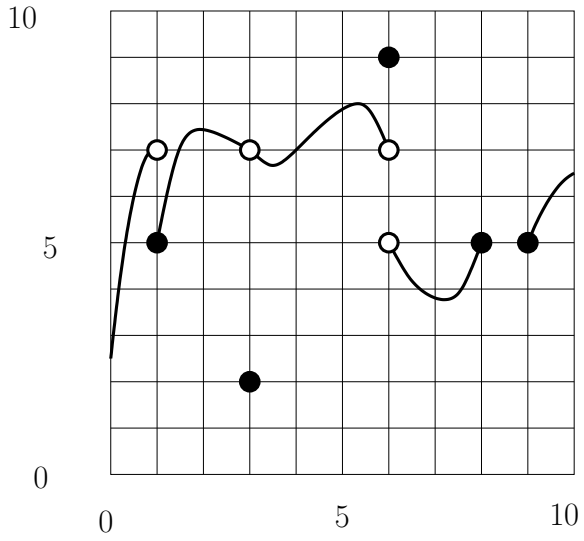

FIGURE 2. $f(x)$

(a) $\lim_{x\to 6-} f(x)$

(b) $\lim_{x\to 6+} f(x)$

(c) $\lim_{x\to 3} f(x)$

(d) $\lim_{x\to 1-} f(x)$

(e) $\lim_{x\to 1+} f(x)$

(f) $\lim_{x\to 9} f(x)$

(8) Evaluate these limits. For an infinite limit, write $+\infty$ or $-\infty$. If a limit does not exist (DNE), you must justify why this is the case.

(a) $\lim_{x\to 5} \frac{\sqrt{x-1}-2}{x-5}$

(b) $\lim_{x\to -3} \frac{x^2+5x+6}{|x+3|}$

(c) $\lim_{x\to 0} \frac{\tan 3x}{5x}$

(d) $\lim_{x\to 0} \frac{x^2}{\sin(\frac{\pi}{x})}$

(e) $\lim_{x\to 0+} \left(\frac{1}{\sqrt{x+1}} - \frac{1}{\sqrt{x^2+x}}\right)$

(9) For what value of c (if any) is the function $f(x)$ continuous at $x = 1$? Justify your answer.

$$f(x) = \begin{cases} \frac{2-x}{x+2} & x < 1 \\ c & x = 1 \\ x\cos(\pi x) & x > 1 \end{cases}$$

(10) For a sphere of radius r, its surface area $S = 4\pi r^2$. What is the average rate of change of the surface area when the radius increases from $r = 2$ to $r = 4$?