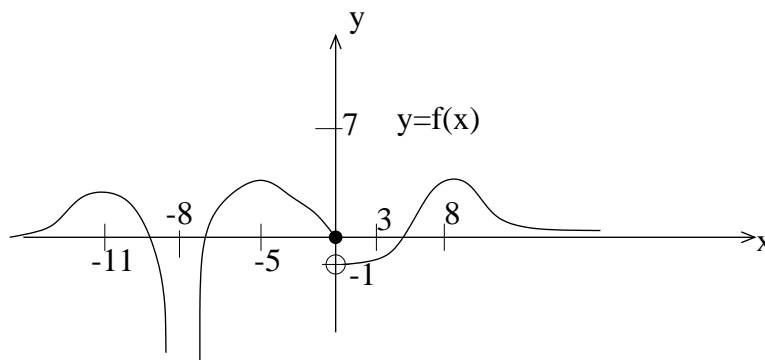


Math 125 Carter Sample Test 1 Fall 2001

1. For the graph of the function illustrated in below determine the following:



- (a) $\lim_{x \rightarrow -3^-} f(x)$
- (b) $\lim_{x \rightarrow -3^+} f(x)$
- (c) $\lim_{x \rightarrow 8^-} f(x)$
- (d) $\lim_{x \rightarrow -3^+} f(x)$
- (e) $\lim_{x \rightarrow -\infty} f(x)$
- (f) $\lim_{x \rightarrow \infty} f(x)$
- (g) $f(-3)$
- (h) Is $y = f(x)$ continuous at $x = 3$?

2. Compute the following limits

- (a) $\lim_{x \rightarrow \infty} \frac{3x^2}{5x^2 + 2x - 2}$
- (b) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$
- (c) $\lim_{x \rightarrow 0} \frac{(x + 1)^2 - 1}{x}$
- (d) $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 9} - 3}{x^2}$

3. For a function $y = f(x)$ give the algebraic expression for the Newton quotient at the point $x = a$.

4. The following expressions are the derivatives of a function $y = g(x)$ at a point $x = b$ for various functions. In each case identify $g(x)$ and the point b . DO NOT COMPUTE THE LIMITS.

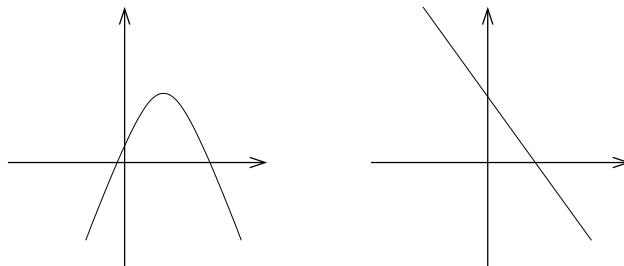
(a)
$$\lim_{h \rightarrow 0} \frac{(h+1)^2 - 1}{h}$$

(b)
$$\lim_{x \rightarrow 9} \frac{\sqrt{x+9} - 3}{x-9}$$

(c)
$$\lim_{h \rightarrow 0} \frac{\sin(\frac{\pi}{2} + h) - 1}{h}$$

(d)
$$\lim_{x \rightarrow 0} e^3 \frac{e^h - 1}{h}$$

5. In the Figure below one of the graphs represents a function; the other represents its derivative. Which is which and why?



6. For each of the functions below compute the derivative $f'(x)$ by computing the limit of the Newton quotient:

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

NB: the above expression is the answer to a question above. DO NOT COUNT ON ME GIVING THE ANSWER ON THE TEST!

(a) $f(x) = 3x + 2$

(b) $f(x) = x^2 + 3x$

(c) $f(x) = \sqrt{x}$

(d) $f(x) = \frac{1}{x}$

7. Give the equation of the line tangent to the curve $y = x^2 + 3x$ at the point $x = -3/2$. Explain the meaning of your answer.