B

Name:_____ 1 2 Total

Intuitive Calculus (Mathematics 11012) Quiz 1
January 28, 2010 Richard M. Aron

1. Let $f(x) = x^2 + 3x$.
(a). Find $f(2)$. 10

(b). Find $f'(x)$, by using the definition of derivative.

$$\frac{f(x+h)-f(x)}{h} = \frac{[(x+h)^2+3(x+h)]-[x^2+3x]}{h}$$

$$= \frac{[x^2+2xh+h^2+3x+3h-x^2-3x]}{h}$$

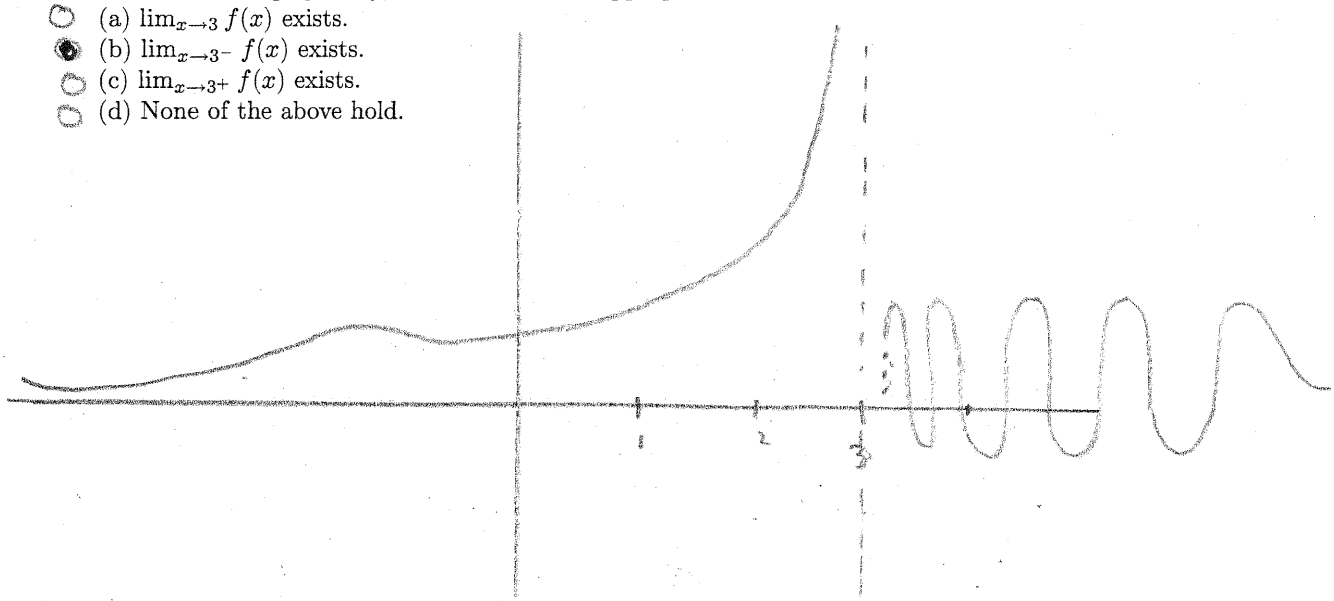
$$= \frac{2xh+h^2+3h}{h} = 2x+3+h \to 2x+3 \text{ as } h \to 0.$$

So, $f'(x) = 2x+3$

(c). Find the equation of the tangent line to the curve $y = x^2 + 2x$ at the point $(2, f(2))$. $\frac{y-f(2)}{x-2} = f'(2)$. So, $\frac{y-10}{x-2} = f'(2) = 7$

So, $y-10 = 7(x-2)$, or $y = 7x-4$

2. Look at the graph of f, below. Fill in the appropriate blank:
○ (a) $\lim_{x\to 3} f(x)$ exists.
● (b) $\lim_{x\to 3^-} f(x)$ exists.
○ (c) $\lim_{x\to 3^+} f(x)$ exists.
○ (d) None of the above hold.



A

Name:_____ 1 2 Total

Intuitive Calculus (Mathematics 11012) Quiz 1
January 28, 2010 Richard M. Aron

1. Let $f(x) = x^2 - x$.
(a). Find $f(2)$. 2

(b). Find $f'(x)$, by using the definition of derivative.

$$\frac{f(x+h)-f(x)}{h} = \frac{[(x+h)^2-(x+h)]-[x^2-x]}{h} =$$

$$= \frac{[x^2+2xh+h^2-x-h]-[x^2-x]}{h} =$$

$$= \frac{2xh+h^2-h}{h} = 2x-1+h \to 2x-1 \text{ as } h \to 0$$

$$f'(x) = 2x-1$$

(c). Find the equation of the tangent line to the curve $y = x^2 + 2x$ at the point $(2, f(2))$.

$$\frac{y-2}{x-2} = f'(2) = 3,$$

$$y-2 = 3(x-2), \quad y-2 = 3x-6, \quad y = 3x-4$$

2. Look at the graph of f, below. Fill in the appropriate blank:

- (a) $\lim_{x\to 2} f(x)$ exists.
- (b) $\lim_{x\to 2^-} f(x)$ exists.
- (c) $\lim_{x\to 2^+} f(x)$ exists.
- (d) None of the above hold.