

# Math 2143 - Brief Calculus with Applications

Quiz #13 - 2008.03.26

Name: \_\_\_\_\_

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1. Compute the following limit.

$$\lim_{x \rightarrow 1} \frac{\sqrt{x^2 + x + 23} - 5}{x - 1}$$

2. Compute the following derivative.

$$\frac{d}{dv} \left( v^3 \cdot \left( v - \frac{1 + 3v}{2v^2 + 1} \right) \right)$$

3. Fill in the blanks for the following statements.

a) If  $f(x)$  is increasing and concave up at  $x = a$ , then  $f'(a)$ \_\_0 and  $f''(a)$ \_\_0.

b) If  $f(x)$  is decreasing and concave up at  $x = b$ , then  $f'(b)$ \_\_0 and  $f''(b)$ \_\_0.

c) If  $f(x)$  has a local minimum  $x = c$ , then  $f'(c)$ \_\_0 and  $f''(c)$ \_\_0.

c) If  $f(x)$  has a local maximum  $x = d$ , then  $f'(d)$ \_\_0 and  $f''(d)$ \_\_0.