Math 108, Business Calculus Name ANSWER KEY A
Quiz 2, Sections 2.1 and 2.2 March 20, 2009

Show all work neatly. Use of calculators is not permitted. (Each problem is worth 4 points)

1. Using the general (limit) definition of the derivative function, find the derivative of the function $f(x) = x^2 - 4x + 3$. You must show all work to receive credit for this problem.

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0} \frac{(x+h)^2 - 4(x+h)+3 - (x^2-4x+3)}{h}$$

$$= \lim_{h\to 0} \frac{x^2+2xh+h^2-4x-4h+3-x^2+4x-3}{h}$$

$$= \lim_{h\to 0} \frac{2xh+h^2-4h}{h} = \lim_{h\to 0} \frac{h(2x+h-4)}{h} =$$

$$\lim_{h\to 0} 2x+h-4 \quad (h \to 0) \quad = \boxed{2x-4}$$

2. Using any correct technique, find the derivative of each of the following functions:

a) $f(x) = x^7 - 8x + \sqrt{13}$ (use power rule)

$f'(x) = 7x^6 - 8 + 0 = \boxed{7x^6 - 8}$

b) $g(x) = \sqrt{x^5} + \frac{1}{x^5} = x^{5/2} + x^{-5}$ (rewritten)

$g'(x) = \frac{5}{2}x^{\frac{5}{2}-1} - 5x^{-5-1} = \boxed{\frac{5}{2}x^{3/2} - 5x^{-6}}$

Math 108, Business Calculus
Quiz 2, Sections 2.1 and 2.2

Name ANSWER KEY B
March 20, 2009

Show all work neatly. Use of calculators is not permitted.

1. Using the general (limit) definition of the derivative function, find the derivative of the function $f(x) = x^2 - 3x + 2$. You must show all work to receive credit for this problem.

$$f'(x) = \lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0} \frac{(x+h)^2-3(x+h)+2-(x^2-3x+2)}{h}$$

$$= \lim_{h\to 0} \frac{(x^2+2xh+h^2)-3x-3h+2-x^2+3x-2}{h}$$

$$= \lim_{h\to 0} \frac{2xh+h^2-3h}{h} = \lim_{h\to 0} \frac{h(2x+h-3)}{h}$$

$$= \lim_{h\to 0} 2x+h-3 \quad (h \to 0) \quad = \boxed{2x-3}$$

2. Using any correct technique, find the derivative of each of the following functions:

a) $f(x) = x^5 - 6x + \sqrt{7}$ (use power rule)

$$f'(x) = 5x^4 - 6 + 0$$

$$= \boxed{5x^4 - 6}$$

b) $g(x) = \sqrt{x^3} + \frac{1}{x^3} = x^{3/2} + x^{-3}$ (rewritten)

$$g'(x) = \frac{3}{2} \cdot x^{3/2-1} - 3x^{-3-1}$$

$$= \boxed{\frac{3}{2}x^{1/2} - 3x^{-4}}$$