Math 1110, Sec. 08

Name: SOLUTION

Quiz 4

1. **[4 points]** Use the definition of the derivative to find $f'(2)$ if $f(x) = 5x^2$.

Solution #1

$$f'(2) = \lim_{x\to 2} \frac{f(x)-f(2)}{x-2} = \lim_{x\to 2} \frac{5x^2-20}{x-2} = \lim_{x\to 2} \frac{5(x^2-4)}{x-2} = \lim_{x\to 2} \frac{5(x-2)(x+2)}{x-2} = \lim_{x\to 2} 5(x+2) = \boxed{20}$$

Solution #2

$$f'(2) = \lim_{h\to 0} \frac{f(2+h)-f(2)}{h} = \lim_{h\to 0} \frac{5(2+h)^2-20}{h} = \lim_{h\to 0} \frac{5(h^2+4h+4)-20}{h} = \lim_{h\to 0} \frac{5h^2+20h}{h} = \lim_{h\to 0} 5h+20 = \boxed{20}$$

2. **[6 points]** Find the derivatives of the following functions.

(a) $\frac{x^4}{2} + 4\sin x - e^x = \frac{1}{2}x^4 + 4\sin x - e^x$

So $\boxed{2x^3 + 4\cos x - e^x}$

(b) $2 + \sqrt{x}\cos x$

$$\boxed{\frac{1}{2\sqrt{x}}\cos x + \sqrt{x}(-\sin x)}$$