MATHEMATICS 180 – Section 005

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TOTAL_____

1.(*20 pts.*) Let $f(x) = 2x^3$. Consider the point $P = (1, 2)$ on the graph of $f(x)$.

a) Find the equation of the line L tangent to $f(x)$ at P.

b) Find points on the graph of $f(x)$ at which the tangent line has slope $m = 6$. Write down the equations of the tangent lines at these points.

2. (*30 pts.*) Compute the following

a) $y(x) = (x+1)^3 - \frac{1}{x^2}, \qquad y'(x) =$

b)

$$\frac{d}{dx}\left(\sqrt[3]{x^2} \cdot \sqrt[3]{x^4}\right) =$$

c) $y(x) = (x^2+1)^4, \qquad y'(x) =$

d) $y(x) = \frac{4}{\sqrt{x^2+2}}, \qquad y'(x) =$

e) $\frac{d}{dx}(2x^2 - 3) \mid_{x=5} =$

f) $f(x) = a^2x^2 + 2b^3x + c^4.$

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

$$\frac{d^2}{dx^2}f(x) =$$

3. (*30 pts.*) Compute the following

a) $f(P) = (P+1)^5$.

$$\frac{d^2}{dP^2} f(P) =$$

b)

$$\frac{d^2}{dx^2}(x^3 - x - 1) \mid_{x=2} =$$

c) $f(x) = (\sqrt{x}+1)^{3/2}$.

$$f'(x) \mid_{x=4} =$$

d) $f(x) = x^{10}$.

$$\frac{d^3}{dx^3} f(x) =$$

e)

$$\lim_{x \to 4} \frac{x^2 - 16}{4 + x} =$$

f)

$$\lim_{x \to 2} \sqrt[3]{x^3 + 19} =$$

4.(*20 pts.*) Let $f(x) = \frac{3}{x}$.

a) Compute $f(1+h) - f(1)$,

$$f(1+h) - f(1) =$$

b) Compute the difference quotient $\frac{f(1+h)-f(1)}{h}$ and simplify,

$$\frac{f(1+h) - f(1)}{h} =$$

c) Compute the limit in b) when $h \to 0$, that is

$$f'(1) = \lim_{h \to 0} \frac{f(1+h) - f(1)}{h} =$$