

MCV4U – Exam Review Day 3

Multiple Choice:

1. The derivative of the function $y = f(x)$ where $x = 3$ is
- A. $\lim_{\Delta x \rightarrow 0} \frac{f(x+a) - f(x)}{\Delta x}$ B. $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$
C. $\lim_{h \rightarrow 0} \frac{f(x+3) - f(x)}{h}$ D. $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$ E. none of these
2. The Power Differentiation Rule is
- A. $\frac{d}{dx}(x^n) = nx^{n-1}$ B. $\frac{d}{dx}(k) = 0, k \in R$
C. $\frac{d}{dx}(u^n) = nu^{n-1} \frac{du}{dx}$, if u is a function of x
D. $\frac{d}{dx}(u^n) = nu^{n-1}$ E. none of these
3. If $f(x) = r(x)h(x)$ then $f'(x) =$
- A. $r(x)h'(x) - h(x)r'(x)$ B. $r'(x)h'(x)$
C. $h(x)r'(x) - r(x)h'(x)$ D. $r'(x)h(x) + h'(x)r(x)$ E. none of these
4. If $y = f(g(x))$, then $\frac{dy}{dx} =$
- A. $f(g'(x))$ B. $f(g'(x))g(x)$ C. $f'(g(x))$
D. $f'(g'(x))$ E. none of these
5. The graph of the function $y = f(x)$ is always concave up where
- A. $f'(x) = 0$ B. $f''(x) = 0$ C. $f''(x) < 0$
D. $f''(x) > 0$ E. $f'(x) \leq 0$
6. $\frac{d}{dx}[2e^{3x}] =$
- A. $2e^{3x}$ B. e^{3x} C. $2e^x$ D. $6e^{3x}$ E. none of these
7. If $y = \sin 5x$, then $y' =$
- A. $-\cos 5x$ B. $5 \cos x$ C. $-5 \cos 5x$ D. $5 \cos 5x$ E. none of these
8. What kind of line shows an instantaneous rate of change the best?
- A. a secant line B. a tangent line
9. $\frac{d}{dx}[5^{4x^2}] =$
- A. $8x5^{4x^2}$ B. $8x(\ln 5)5^{4x^2}$ C. $4x^2 5^{4x^2-1}$
D. $8x5^{4x^2-1}$ E. $(\ln 5)5^{8x}$
10. An interval upon which a function has a negative derivative it is said to be _____.
- A. concave up B. increasing C. concave down
D. decreasing E. none of these

11. An interval upon which a function has a positive second derivative the function is said to be _____.
- A. concave up B. increasing C. concave down
D. decreasing E. none of these
12. Which of the following is **not** a proper symbol for the derivative?
- A. y' B. $\frac{dy}{dx}$ C. $\frac{d}{dx}$ D. D_x E. $h'(x)$

Short Answer:

1. What is an average rate of change? Give an example.
2. The weasel population (in hundreds) in an area is modeled for the next 8 years by the function $P(t) = -2t^2 + 16t + 5$.
- a) What is the instantaneous rate of change of the population at 2 years?
- b) What is happening to the population at 2 years? What do you think might be causing this change in the population?
3. Find the equation of the tangent line to the function $y = 4x^3 - 5x^2 + 8x$ where $x = 1$.

4. Find the first derivative for each of the following functions

a) $f(x) = 4x^7 - \sqrt{2}x^3 - 8x + 6$

b) $f(x) = (2x^3 - 5x)^6$

c) $y = \frac{28x^3 + 14x^2 - 21x}{7x}$

d) $f(x) = 7x^5\sqrt{3x^4 - 5x^2}$

e) $f(x) = \frac{5}{(5x^2 + 8)^3}$

f) $f(x) = \sin(x^2 + 1)$

g) $y = 4e^{x^3}$

h) $y = (e^{2x})\sin(4x - 5)$

i) $f(x) = 6^{4x}$

j) $b(x) = 6\cos 4x^2$