

MATH 110
Differentiation
Worksheet (1)

Choose the correct answer:

1. The function $f(x) = x $ has a at $x = 0$.	
(a) vertical tangent line	(c) nonvertical tangent line
(b) horizontal tangent line	(d) no tangent line

2. The function $f(x) = x^3 + 5$ has a at the point $(1, 6)$.	
(a) vertical tangent line	(c) nonvertical tangent line
(b) horizontal tangent line	(d) no tangent line

3. The derivative formula of the function $f(x) = x^2 + 1$ is $f'(x) = \dots\dots\dots$	
(a) $\lim_{h \rightarrow 0} \frac{(x^2 + h + 1) - (x^2 + 1)}{h}$	(c) $\lim_{h \rightarrow 0} \frac{(x + h)^2 + 1 - (x^2 + 1)}{h}$
(b) $\lim_{h \rightarrow 0} \frac{(x + h + 1)^2 - (x^2 + 1)}{h}$	(d) $\lim_{h \rightarrow 0} \frac{(x^2 + h)^2 + 1 - (x^2 + 1)}{h}$

4. The derivative of the function $f(x) = 5x^6 + x^3 + 1$ is	
(a) $f'(x) = 6x^5 + 3x^2$	(c) $f'(x) = 30x^5 + 3x + 1$
(b) $f'(x) = 11x^5 + 3x^2$	(d) $f'(x) = 30x^5 + 3x^2$

5. The derivative of the function $f(x) = \frac{2x+1}{x+2}$ is	
(a) $f'(x) = \frac{2}{(x+2)^2}$	(c) $f'(x) = \frac{5}{(x+2)^2}$
(b) $f'(x) = \frac{3}{(x+2)^2}$	(d) $f'(x) = \frac{3x+2}{(x+2)^2}$
6. The derivative of the function $f(x) = \frac{1}{4x}$ is	
(a) $f'(x) = -\frac{1}{4x^2}$	(c) $f'(x) = \frac{1}{4}$
(b) $f'(x) = -\frac{1}{16x^2}$	(d) $f'(x) = 4$
7. $\frac{d}{dx} \left(\frac{x^5 + 2x^4 + 3x^2 + 1}{x} \right) = \dots\dots\dots$	
(a) $4x^3 + 6x^2 + 3 + \frac{1}{x^2}$	(c) $4x^3 + 6x^2 + 3 - \frac{1}{x^2}$
(b) $5x^2 + 8x + \frac{6}{x}$	(d) $4x^3 + 6x^2 + 4$
8. If $f(x) = x^{5/2} + 2x^{3/2} + 4$, then $f'(x) = \dots\dots\dots$	
(a) $\frac{5}{2}x^2 + 3x$	(c) $\frac{5}{2}x^{3/2} + 3x^{1/2}$
(b) $\frac{5}{2}x^3 + 3x$	(d) $\frac{5}{2}x^{3/2} + \frac{3}{2}x^{1/2}$
9. $\frac{d}{dx} \left(\frac{4x}{1+x^2} \right) \Big _{x=2} = \dots\dots\dots$	
(a) $\frac{12}{25}$	(c) $\frac{12}{5}$
(b) $-\frac{12}{25}$	(d) $-\frac{12}{5}$

10. The equation of the tangent line to $f(x) = x^2 + 2x$ at $x = 4$ is	
(a) $y = 10x + 64$	(c) $y = 10x + 16$
(b) $y = 10x - 64$	(d) $y = 10x - 16$
11. The equation of the normal line to $f(x) = \sqrt{x}$ at $x = 9$ is	
(a) $y = -6x + 57$	(c) $y = 6x + 57$
(b) $y = \frac{1}{6}x + 57$	(d) $y = -\frac{1}{6}x + 57$