Honors Calculus
Chapter 2 Review

Find the derivative by the limit process.

1) $h(x) = 6x - x^2$
2) $m(x) = \sqrt{x-4}$

Find $f'(4)$ using the alternate form of the derivative.

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

Sketch each function. State the interval(s) where each function is differentiable in interval notation.

5) $f(x) = |x-3| + 2$ 6) $g(x) = (x+2)^{2/3}$ 7) $h(x) = -\sqrt[3]{x} - 2$

Differentiate. Simplify and factor completely (where possible). Re-write without using negative exponents.

8) $y = \tan(3x)$
9) $f(t) = \dfrac{5t^3 + 7t^2 - 4}{t}$
10) $f(x) = \sqrt{1-x}$
11) $y = 4\csc x - 2\sec x + 5x - 7$
12) $g(x) = 2x(3-x)^4$
13) $y = 6\sqrt[3]{x} - \sqrt{x}$
14) $y = \dfrac{x-4}{x^2+1}$
15) $h(t) = \sin^2(4t)$
16) $f(x) = 5x\cot\left(x^2\right)$
17) $y = -\dfrac{2}{\sqrt{4x+7}}$
18) $s(t) = t^3 - 5t^2 - t - 1$
19) $y = \dfrac{\sin x}{x}$

Find the slope at the given value of c. Simplify the answer.

20) $f(x) = \sqrt[3]{1-x}$; c = -7

21) $g(x) = \sec(5x)$; $c = \dfrac{\pi}{3}$

Write the equation of the tangent line at the given point.

22) $f(x)=\frac{\cot x}{x}$; $\left(\frac{\pi}{4},\frac{4}{\pi}\right)$

23) $y=5x^3-7x-6$; (1, -8)

Determine the point(s) where the function has horizontal tangent(s).

24) $f(x)=2x^3+3x^2-12x$

25. $f(x)=\frac{x^2+1}{x}$

Find $\frac{d^2y}{dx^2}$. Factor completely.

26) $f(x)=\sec x$

27) $g(x)=(x^2+1)^5$

Given the following information, find the derivatives indicated.

$h(x)=f(x)g(x)$
$m(x)=f(g(x))$
$n(x)=\frac{g(x)}{f(x)}$
$k(x)=(f(x))^4$

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	5	−1	3	2
3	6	2	−2	−4
5	−3	-2	5	−1

28) $h'(2)$
29) $m'(2)$
30) $n'(3)$
31) k'(5)

32) Is f(x) continuous and differentiable? Explain.

$$f(x)=\begin{cases} 2-x & x\le 1 \\ x^2-2x+2 & x>1 \end{cases}$$

33) Find a and b so that g(x) is continuous and differentiable.

$$f(x)=\begin{cases} a-bx^3 & x\le 1 \\ b+4x & x>1 \end{cases}$$

Honors Calculus

Chapter 2 Review Answers

For #1 and #2, use $f'(x)=\lim_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$

1) $h'(x)=6-2x$

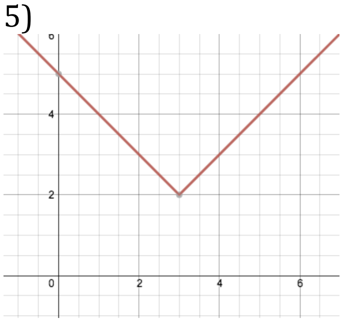
2) $m'(x)=\dfrac{1}{2\sqrt{x-4}}$

For #4 and #4, use $f'(c)=\lim_{x\to c}\dfrac{f(x)-f(c)}{x-c}$

3) $f'(4)=26$

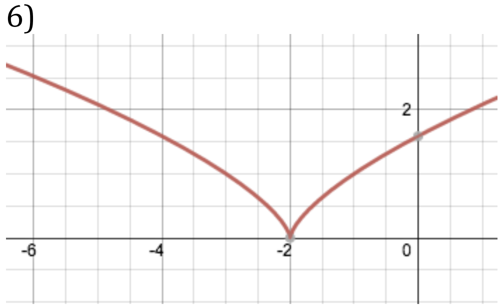
4) $f'(4)=\dfrac{1}{4}$

5)



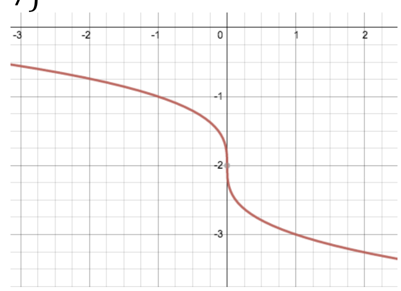
$(-\infty,3)\cup(3,\infty)$

6)



$(-\infty,-2)\cup(-2,\infty)$

7)



$(-\infty,0)\cup(0,\infty)$

8) $y'=3\sec^2(3x)$

9) $f'(t)=10t+7+\dfrac{4}{t^2}$

10) $f'(x)=-\dfrac{1}{2(1-x)^{1/2}}$

11) $y'=-4\csc x\cot x-2\sec x\tan x+5$

12) $g'(x)=2(3-x)^3(3-5x)$

13) $y'=\dfrac{2}{x^{2/3}}-\dfrac{1}{2x^{1/2}}$

14) $y'=\dfrac{-x^2+8x+1}{(x^2+1)^2}$

15) $h'(t)=8\sin(4t)\cos(4t)$

16) $f'(x)=-5(2x^2\csc^2 x^2-\cot x^2)$

17) $y' = \frac{4}{(4x+7)^{3/2}}$

18) $s'(t) = 3t^2 - 10t - 1$

19) $y' = \frac{x\cos x - \sin x}{x^2}$

20) $f'(-7) = -\frac{1}{12}$

21) $g'\left(\frac{\pi}{3}\right) = -10\sqrt{3}$

22) $y - \frac{4}{\pi} = \left(\frac{-8\pi - 16}{\pi^2}\right)\left(x - \frac{\pi}{4}\right)$

23) $y + 8 = 8(x-1)$

24) (1, -7) (-2, 20)

25) (1, 2) (-1, -2)

26) $f''(x) = \sec x(\sec^2 x + \tan^2 x)$

27) $g''(x) = 10(x^2+1)^3(9x^2+1)$

28) 7

29) 4

30) -5/9

31) 216

32) Continuous but not differentiable.

33) a = 4/3 b = -4/3