

AP Calculus BC – Unit 2 Solutions

Worksheet 7

1) $a = -1$	2) Show using IVT	3) Answers vary
4) a) 19 b) 1	5) a) $\frac{e - \frac{1}{e^2}}{2}$ b) $\frac{e^3 - e}{2}$	6) a) $\frac{\ln 4}{3}$ b) $\frac{\ln 103 - \ln 100}{3} = \frac{1}{3} \ln \frac{103}{100}$
7) a) $-\frac{2}{\pi}$ b) 0	8) 6	9) 3
		10) $\frac{8}{3}$
11) -60 gal/min	12) -0.1968 pounds/day	13) a) 11.025 m b) 22.05 m/sec c) 19.649; 19.6049; 19.600049

Worksheet 8

1) $-\frac{1}{4}$	2) 2	3) 1	4) 2
5) $\frac{1}{4}$	6) 2	7) $f(x)$ is not differentiable at $x=0$	
8) a) $f(x)$ is differentiable at $x=0$. b) $g(x)$ is not cont at $x=5 \rightarrow g(x)$ is not diff at $x=5$. c) $(-\infty, 5) \cup (5, \infty)$	9) $(-\infty, 0) \cup (0, \infty)$	10) $(-\infty, 1) \cup (1, \infty)$	

Worksheet 9

1) $g'(t) = 10t^{\frac{2}{3}}$	2) $B'(x) = \frac{(x-1)(16x-6) - (8x^2-6x+11)}{(x-1)^2}$
3) $f'(s) = -1 - 8s - 20s^3$	4) $G'(v) = \frac{(v^3+1)(3v^2) - (v^3-1)(3v^2)}{(v^3+1)^2}$
5) $f'(x) = 6x + \frac{4}{3}x^{\frac{1}{3}}$	6) $g'(t) = \frac{(3t-5)\left(\frac{2}{3}t^{-\frac{1}{3}}\right) - t^{\frac{2}{3}}(3)}{(3t-5)^2}$
7) $p'(x) = -x^{-2} - 2x^{-3} - 3x^{-4}$	8) $k'(x) = (2x^2 - 4x + 1)(6) + (6x - 5)(4x - 4)$
9) $h'(x) = x^{\frac{2}{3}}(6x - 2) + \frac{2}{3}x^{-\frac{1}{3}}(3x^2 - 2x + 5)$	10) $M'(x) = 2 - 4x^{-2} - 6x^{-3}$

11) $f'(x) = \frac{(3x+2)(4) - (4x-5)(3)}{(3x+2)^2}$	12) $f'(x) = -(1+x+x^2+x^3)^{-2}(1+2x+3x^2)$
13) See Worked-Out Solutions	14) True
15) C	16) $k = -2$

Worksheet 10

1) $x = -2, 1$	2) $x = -1 \pm \frac{\sqrt{6}}{3}$	3) T: $y - 20 = -24(x + 2)$ N: $y - 20 = \frac{1}{24}(x + 2)$
4) T: $y - 2 = \frac{1}{4}(x - 4)$ N: $y - 2 = -4(x - 4)$	5) $y - 8 = 3(x - 4)$	6) N: $y - 3 = -\frac{1}{9}(x - 2)$
7) $y + 3 = -1(x - 1)$	8) $(-1, 27); (2, -24)$	9) $f''(x) = 2x^{-3}$
10) $\frac{d^2y}{dx^2} = -\frac{1}{4}x^{-3/2}$	11) $\frac{1}{2}$	12) -2
13) -3	14) -1	15) 2

Worksheet 11

1) $f'(x) = -\sin x$	2) $f'(x) = \frac{(1+x^2)(\sec^2 x) - \tan x(2x)}{(1+x^2)^2}$
3) $g'(w) = \frac{(1 - \sec w)(\sec w \tan w) - (1 + \sec w)(-\sec w \tan w)}{(1 - \sec w)^2}$	4) $k'(v) = \csc^2 v$
5) $k'(x) = \cos x + 6x^2 + 4\sec^2 x$	6) $F'(x) = \frac{(1 - \sin x)(-\sin^2 x) - \cos x(-\cos x)}{(1 - \sin x)^2}$
7) $r'(a) = -3a^2 \csc(a^3) \cot(a^3)$	8) $H'(s) = -\left(2s - \frac{2}{\sqrt{s}}\right) \csc^2(s^2 - 4\sqrt{s})$
9) $f'(x) = -5\sin x \sec^2(\cos x)$	10) $f'(x) = -\sin x + 6x$
11) $p'(w) = \frac{1}{2\sqrt{w}} \sec^2 w$	12) $P'(v) = 0$
13) $N'(x) = \cos x + 5\sin x$	14) $h'(x) = -x^3 \csc x \cot x + 3x^2 \csc x$

15) $L'(x) = \sec x \tan^2 x + \sec^3 x$	16) T: $y - 3 = -1(x - \pi)$ N: $y - 3 = 1(x - \pi)$
17) N: $y + 1 = 1(x - \pi)$	18) $x = \frac{\pi}{2}, \frac{3\pi}{2}$

Worksheet 12

1. $f'(x) = -8(7x + \sqrt{x})^{-9} \left(7 + \frac{1}{2}x^{-\frac{1}{2}} \right)$	2. $f(x) = 5x^3(2x - 5)^4 \cdot 2 + 3x^2(2x - 5)^5$
3. $g'(w) = 4 \csc^3(w^5 - w^3) \left(-\csc(w^5 - w^3) \cot(w^5 - w^3) \right) (5w^4 - 3w^2)$	4. $k'(v) = 2 \sin(5\pi v - 4) \cos(5\pi v - 4) \cdot 5\pi$
5. $k'(x) = -3 \sin^{-4} x \cos x - 3 \cos^2 x (-\sin x)$	6. $F'(x) = \frac{1}{2}(-3 - 9x)^{-\frac{1}{2}}(-9)$
7. $r'(a) = \frac{3}{2}(4a^3 + 5)^{\frac{1}{2}}(12a^2)$	8. $H'(s) = \frac{1}{3}(12s^2 + 8)^{-\frac{2}{3}}(24s)$
9. $y' = -4(4x + 3)^{-3}(4)$	10. $f'(x) = 6 \left(\frac{x-3}{x-8} \right)^5 \left(\frac{(x-8) - (x-3)}{(x-8)^2} \right)$
11. $p'(w) = -1(\csc w + \cot w)^{-2} (-\csc w \cot w - \csc^2 w)$	
12. $P'(v) = 2 \left(\frac{-\cos v}{1 + \sin v} \right) \left(\frac{(1 + \sin v)(-\sin v) - (-\cos v)(\cos v)}{(1 + \sin v)^2} \right)$	

Worksheet 13

1) $f(x)$ is not diff at $x=1$		2) $y' = 4x^3\left(4\sqrt{x} - 3\sqrt[3]{x}\right) + x^4\left(\frac{2}{\sqrt{x}} - \frac{1}{\sqrt[3]{x^2}}\right)$		
3) $f'(x) = \frac{(x-2)(2x+3) - (x^2-3x)}{(x-2)^2}$		4) $y'' = 6(x^2-2x+1)(2x-2) + 3(x^2-2x+1)^2(2)$		
5) T: $y-4=7(x+2)$ N: $y-4=-\frac{1}{7}(x+2)$		6) $\left(\frac{1}{2}, \frac{23}{4}\right)$		7) T: $y-\sqrt{3}=\frac{2}{\sqrt{3}}(x-3)$ N: $y-\sqrt{3}=-\frac{\sqrt{3}}{2}(x-3)$
8) 3	9) -7	10) $-\frac{15}{9}$	11) $\frac{4}{25}$	12) Undefined
13) $y' = x^4(-4\sin x - 3\sec^2 x) + 4x^3(4\cos x - 3\tan x)$			14) $f'(x) = \frac{(1+\tan x)(-\sin x) - \cos x(\sec^2 x)}{(1+\tan x)^2}$	
15-19) see worked-out solutions				