

### AP CALCULUS PROBLEM SET 3 ANSWER KEY

1. a)  $y \approx 2.03$

b)  $y = 1.5$

c) i)  $\frac{dy}{dx} = 2 \sin 2x$

ii)  $\frac{dy}{dx} = \sec^2 x \csc^2 x$

iii)  $\frac{dy}{dx} = \frac{\cos^2(xy) - y}{x}$

d)  $x = 2$

e)  $\frac{1}{4}$

f)  $\frac{d^2y}{dx^2} = -\frac{1}{2} \cos\left(\frac{x}{2}\right)$

g)  $f(x) = \frac{x^3}{3} + \cos x + c_1 x + c_2$

c)  $\frac{d^2y}{dx^2} = \frac{\cos y}{(1 - \sin y)^3}$

7. b) (1, 3)  $y = 3$   
(1, -2)  $y = 2x - 4$

c)  $x = (-24)^{\frac{1}{5}}$

8. a)  $\frac{dy}{dx} = \frac{16x - 5y}{5x + 3y^2}$

b)  $y = 3x - 13$       c)  $y \approx -0.4$

d)  $y^3 + 21y + 7.88 = 0$  or  
 $100y^3 + 2100y + 788 = 0$

e)  $k = -0.373$

4. a)  $\frac{dy}{dx} = \frac{-2x - y}{x + 2y}$

b) at  $x = \pm\sqrt{27}$ ,  $\frac{dy}{dx} = -2$ , tangent lines at  $x$ -intercepts are parallel

c)  $(-6, 3), (6, -3)$

5. b) Slope is 0 at  $(3, 2)$

c)  $\frac{d^2y}{dx^2}$  at  $(3, 2) = -\frac{2}{7}$   
 $y' = 0$  and  $y'' < 0$

local max @  $(3, 2)$

6. a)  $\frac{dy}{dx} = \frac{1}{1 - \sin y}$     b)  $x = \frac{\pi}{2} - 1$