April 29th

1. Find the limit. (a, b are constant)

   (1) $\lim_{x\to 0}\left(\frac{a+x}{a-x}\right)^{\frac{1}{x}}$, $a > 0$

   (2) $\lim_{x\to 0}\frac{\ln(\cos(ax))}{\ln(\cos(bx))}$

2. If $xy + e^y = e$,

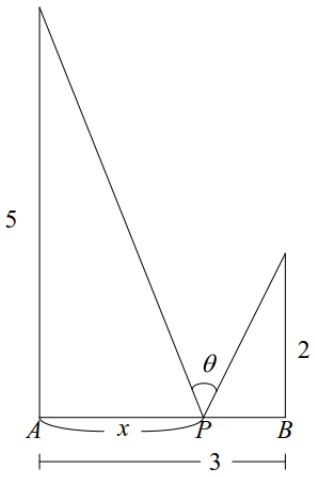
   (1) find $\frac{dy}{dx}$.

   (2) find the values of y, y', y'' at the point where $x = 0$.

3. Choose the point P on the line segment AB so as

   (1) to maximize the angle θ;

   (2) to minimize the angle θ.



4. $\frac{d}{dx}\left(\tan^{-1}x + x^2\sqrt{5x^2+1} + \frac{1}{\ln x}\right) =$ _____

5. $\int_{-1}^{3}|x(x-2)|\,dx =$ _____

6. $\int \tan x \ln(\cos x)\ dx =$ _____

7. $\sin\theta = -\frac{3}{5}$, $\frac{3\pi}{2} < \theta < 2\pi$

   (1) $\cos\theta =$ _____ (2) $\tan 2\theta =$ _____

   (3) $\cos 2\theta =$ _____ (4) $\cos\frac{\theta}{2} =$ _____

8. $0 < \theta < 2\pi$, solve $\cos 2\theta - 5\cos\theta + 3 = 0$.

1. (1) $e^{\frac{2}{a}}$ (2) $\frac{a^2}{b^2}$ **2.** (1) $-\frac{y}{x+e^y}$ (2) $y(0) = 1,\ y'(0) = -\frac{1}{e},\ y''(0) = \frac{1}{e^2}$

3. (1) $x = 5 - 2\sqrt{5}$ (2) $x = 3$ **4.** $\frac{1}{x^2+1} + 2x\sqrt{5x^2+1} + \frac{5x^3}{\sqrt{5x^2+1}} - \frac{1}{x(\ln x)^2}$

5. 4 **6.** $-\frac{1}{2}(\ln(\cos x))^2 + C$

7. (1) $\frac{4}{5}$ (2) $-\frac{24}{7}$ (3) $\frac{7}{25}$ (4) $-\frac{3}{\sqrt{10}}$ **8.** $\theta = \frac{\pi}{3}$ or $\frac{4\pi}{3}$