

4. $\int_0^{\pi/2} |\sin x - \cos x| dx$

$$\sin x - \cos x = 0$$

$$\sin x - \cos x > 0 \text{ When}$$

$$\sin x = \cos x$$

$$\sin x - \cos x < 0 \text{ When } x$$

$$x = \pi/4$$

$$-\int_0^{\pi/4} (\sin x - \cos x) dx + \int_{\pi/4}^{\pi/2} \sin x - \cos x dx$$

$$\int_0^{\pi/4} -\sin x + \cos x dx + -\cos x - \sin x$$

$$\cos x + \sin x \Big|_0^{\pi/4} - \cos x + \sin x \Big|_{\pi/4}^{\pi/2}$$

$$\cos \pi/4 + \sin \pi/4 - (\cos 0 + \sin 0) - \left[\cos \pi/2 + \sin \pi/2 - (\cos \pi/4 + \sin \pi/4) \right]$$

$$\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} - (1+0) - \left[0+1 - \left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} \right) \right]$$

$$\frac{2\sqrt{2}}{2} - 1 - 1 + \frac{2\sqrt{2}}{2}$$

$$\frac{4\sqrt{2} - 2}{2}$$

$$\boxed{2\sqrt{2} - 2}$$

5. $\sqrt{1+2x}$

6. $\frac{\cos \sqrt{x}}{\sqrt{x}} \cdot \frac{1}{2} x^{-1/2}$

$$\frac{\cos \sqrt{x}}{2x}$$

7. $\frac{\sqrt{1+x^2}}{2x} \cdot 2x$

8. $x^2 \sin x$