**MTH151 - Quiz #2** **Name:**

**For full credit, you must show all work and circle your final answer.**

$\boxed{1}$ Use the technique of partial fractions to integrate the following

$$\int \frac{x}{(x+4)(x-1)}\,dx$$

$$\int \frac{x}{(x+4)(x-1)}\,dx = \frac{4}{5}\ln|x+4| + \frac{1}{5}\ln|x-1| + C$$

$$\frac{x}{(x+4)(x-1)} = \frac{A}{(x+4)} + \frac{B}{(x-1)}$$

$$\Rightarrow \quad x = A(x-1) + B(x+4)$$

$x = 1$ we get $1 = B(5) \Rightarrow B = \frac{1}{5}$

$x = -4$ we get $-4 = A(-5) \Rightarrow A = \frac{4}{5}$

$\boxed{2}$ Use trig-substitution to integrate the following:

$$\int \frac{x^3}{\sqrt{9-x^2}}\,dx$$

$$\int \frac{x^3}{\sqrt{9-x^2}}\,dx$$ let $x = 3\sin\theta$ ; $dx = 3\cos\theta\,d\theta$

$\sqrt{9-x^2} = 3\cos\theta$

$$= \int \frac{27\sin^3\theta \cdot 3\cos\theta}{3\cos\theta}\,d\theta$$

$$= 27\int \sin^2\theta\,\sin\theta\,d\theta$$

$$= 27\int (1-\cos^2\theta)\sin\theta\,d\theta$$

$$= -27\cos\theta - 9\cos^3\theta + C$$

$$= -9\sqrt{9-x^2} - 9\left(\frac{1}{3}\sqrt{9-x^2}\right)^3 + C$$

$$= -9\sqrt{9-x^2} - \frac{1}{3}\left(\sqrt{9-x^2}\right)^3 + C$$