EXERCISE SHEET : OPTIMIZATION

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1. Find the absolute maximum and minimum of the function $f(x) = \cos(x) + \sin(x)$ in the interval $[0, 2\pi]$.

2. Find the absolute maximum and minimum of the function $f(x) = 3x\sqrt{1 - x^2}$ in the interval $[-1, 1]$.

3. You have 400 feet of fencing to construct a rectangular pen for cattle. What are the dimensions of the pen that maximize the area ?

4. A truck uses gas as $g(v) = v + 4v^{-1}$, where $v > 0$ represents the speed of the truck and $g(v)$ represents the gallons of fuel per mile. At what speed is fuel consumption minimized ?

5. Find the area of the largest rectangle that fits into the triangle with sides $x = 0$, $y = 0$ and $\frac{x}{4} + \frac{y}{6} = 1$.