

1. $f(x) = \frac{1}{x} + \ln(x)$

$$f'(x) = -\frac{1}{x^2} + \frac{1}{x}$$

$$= \frac{x-1}{x^2}$$

$$f'(x)=0 \text{ if } x=1$$

$f'(x)$ undefined if $x=0$.

Domain of f is $(0, \infty)$

The only critical number is $x=1$.

L19 p3

2. $f(x) = x^2 + \cos^{-1}(x)$

$$f'(x) = 2x - \frac{1}{\sqrt{1-x^2}}$$

$$= \frac{2x\sqrt{1-x^2} - 1}{\sqrt{1-x^2}}$$

$$f''(x)=0:$$

$$2x\sqrt{1-x^2} - 1 = 0$$

$$2x\sqrt{1-x^2} = 1$$

$$4x^2(1-x^2) = 1$$

$$4x^4 - 4x^2 + 1 = 0$$

$$(2x^2 - 1)^2 = 0$$

Extraneous
Solution $x^2 = \frac{1}{2}$

~~$$x = -\frac{1}{\sqrt{2}}, \quad x = \frac{1}{\sqrt{2}}$$~~

$$f'(x) \text{ DNE: } x = \pm 1$$

$$f(-1) = 1 + \pi \quad (\text{Abs Max})$$

$$f\left(\frac{1}{\sqrt{2}}\right) = \frac{1}{2} + \frac{\pi}{4} \approx 1.29$$

$$f(1) = 1 \quad (\text{Abs Min})$$