

## Math 105 - Quiz 7 - October 12, 2007

Instructions: Show all of your work and circle your final answers. Calculators are allowed, but notes and books are not.

1. (10 pts.) Find all of the stationary points of  $f(x) = x^2 - \ln x$ . Classify each as a local minimum, local maximum, or terrace point. (Hint: What is the domain of  $f(x)$ ?)

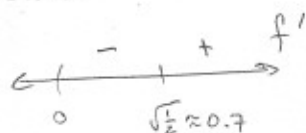
$$f(x) = x^2 - \ln x.$$

$$\text{so } f'(x) = 2x - \frac{1}{x}.$$

Stationary points occur when  $f'(x) = 0$ .

$$2x - \frac{1}{x} = 0 \rightarrow 2x = \frac{1}{x} \rightarrow x^2 = \frac{1}{2} \rightarrow x = \pm \sqrt{\frac{1}{2}}.$$

Domain of  $f(x)$  is  $(0, \infty)$ , so we only look at  $x = \sqrt{\frac{1}{2}}$  as a stationary point.



$$f'(0.5) = -1$$

$$f'(1) = +1.$$

So  $f(x)$  has a local minimum at  $x = \sqrt{\frac{1}{2}}$ .

2. (10 pts.) Find an equation of the line tangent to the curve  $y = 2e^x$  at  $x = 0$ .

$$\text{when } x=0, y = 2e^0 = 2. \quad \text{Pt} = (0, 2).$$

$$\text{Slope? } y' = 2e^x, \text{ so } y' = 2e^0 = 2 \text{ when } x=0.$$

$$\text{Pt} = (0, 2), \text{ slope} = 2.$$

$$y - 2 = 2(x - 0)$$

$$\text{So } \boxed{y = 2x + 2.}$$