

King Fahd University of Petroleum and Minerals  
deprtment of Mathematics and Statistics  
Math 442 (Term 512)  
Quiz 2

---

Name:.....ID:.....

---

**Exercise 1 :** Consider the following variational problem

$$\max J[y] = \int_a^b F(x, y, y') dx$$

over functions  $y$  which are continuous on  $[a, b]$  and having derivative continuous except possibly at a point  $c \in (a, b)$ .

Derive the necessary conditions for the functional to have an extremal in the following two cases

- (i)  $c$  fixed
- (ii)  $c$  not fixed