Information Economics, Fall 2015
Pre-lecture Problems for Lecture 8

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Note. The deadline of submitting the pre-lecture problem is ***9:20am, November 16, 2015***. Please submit a hard copy of your work to the instructor in class. Late submissions will not be accepted. Each student must submit her/his individual work. Submit ONLY the problem that counts for grades.

1. (0 points) Consider the transfer $t(\theta)$ derived on page 27 of the slides:

$$t(\theta) = \theta v(q(\theta)) - \int_{\theta_0}^{\theta} v(q(x))dx,$$

   where $q(\theta)$ is the quantity intended for the type-θ consumer. Show that $t(\theta)$ is increasing in θ.

2. (0 points) Consider the continuous-type screening model introduced in the lecture videos. Assume that there is no information asymmetry.

   (a) Formulate the contract design problem for the type-θ consumer.

   (b) Find the first-best contract $(q^{\text{FB}}(\theta), t^{\text{FB}}(\theta))$ for the type-θ consumer.

3. (10 points) Consider the continuous-type screening model introduced in the lecture videos. Let $\theta \sim \text{Uni}(1, 2)$, $v(q) = q - \frac{1}{2}q^2$, and $c = 0.5$.

   (a) (3 points) Find $f(\theta)$, $F(\theta)$, and $\frac{1-F(\theta)}{f(\theta)}$ over $[1, 2]$.

   (b) (4 points) By applying the FOC derived on page 30 of the slides,

$$\left(\theta - \frac{1 - F(\theta)}{f(\theta)}\right) v'(q^*(\theta)) = c,$$

   find a closed-form expression for $q^*(\theta)$.

   (c) (3 points) Depict $q^*(\theta)$.[1]

[1] One powerful graphing calculator is `https://www.desmos.com/calculator`.