Math 3593H Honors Math II
Quiz 2, Thursday March 2, 2017

Instructions:
20 minutes, closed book, no electronic devices,
but an 8.5×11 page of notes is OK.
There are two problems, worth a total of 20 points.

1. (8 points) On the surface in $\mathbb{R}^3$ which is the graph of

$$z = 8 + x^2 + 2xy + y^2 + 6x^3 - y^5$$

compute the Gauss curvature at the point $\begin{pmatrix} 0 \\ 0 \\ 8 \end{pmatrix}$.

2. (12 points; 4 points each part)

For each of the following functions $\mathbb{R} \xrightarrow{f} \mathbb{R}$, say whether f is (Riemann) integrable or not, and explain your reasoning.

(i) $f(x) = \begin{cases} x^2 & \text{if } x \in [0,1], \\ 0 & \text{otherwise.} \end{cases}$

(ii) $f(x) = \begin{cases} 1 & \text{if } x \in [0,1], \text{ but } x \neq \frac{1}{2}, \frac{3}{8}, \frac{23}{256}, \\ 0 & \text{otherwise.} \end{cases}$

(iii) $f(x) = \begin{cases} 1 & \text{if } x \in [0,1], \text{ and } x \neq \frac{k}{2^m} \text{ for integers } k, m, \text{ with } m \geq 1 \text{ and } 0 \leq k \leq 2^m, \\ 0 & \text{otherwise.} \end{cases}$