Quiz #3 (EngMath I) [Wednesday, October 28, 2015]

Name: _____ **ID No:** _____

1. (10 points) Let $f'(x)$ be continuous on the x-axis, and $f(x) \to 0$, $f'(x) \to 0$ as $|x| \to \infty$. Furthermore, let $f'(x)$ and $f''(x)$ be absolutely integrable on the x-axis. Show that

$$\mathcal{F}[f'(x)] = iw\mathcal{F}[f(x)] \quad \text{and} \quad \mathcal{F}[f''(x)] = -w^2\mathcal{F}[f(x)]$$

2. (15 points)

(a) (8 points) Compute the Fourier series of $f(x+2\pi) = f(x) = x + \pi$ $(-\pi \leq x \leq \pi)$.

(b) (7 points) Show that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$.