Honors Math 182 Quiz 9 Version A

1. Find $\dfrac{d}{dx}\left(x|x|^3\right)$

2. Write Taylor's formula with remainder for the following functions. Take $a = 0$.

(i) $f(x) = e^x$

(ii) $f(x) = \sin x$

(iii) $f(x) = \cos x$

(iv) $f(x) = \ln(1 - x)$

3. Find $\displaystyle\int |x|^3\, dx$

4. Prove the following theorem:

Weighted Mean Value Theorem. Let f be continuous and w be non-negative on the interval $[a, b]$. Then there exists $\xi \in [a, b]$ such that

$$\int_a^b f(t)w(t)\, dt = f(\xi) \int_a^b w(t)\, dt.$$