

Show all your work. Due Marth 17th, 2017.

Name:**Student ID:**

1. **(Linear Approximation)** Let $f(x) = (1 + x)^{1/3}$. Please the linear approximation of $f(x)$ at $x = 0$.

2. **(Differential)** (a) Find differential of function

$$d\left(\frac{x}{x+2}\right).$$

- (b) Find the differential dy if

$$y = (2x^2 - 4)\sqrt{x}$$

3. **(Increasing Decreasing Intervals)** Let $f(x) = x^2 - 6x + 10$. Answer the following questions:
- (a) Which values of x correspond to horizontal tangent line?
 - (b) For which values of x is $f(x)$ increasing? Decreasing?
 - (c) Sketch a graph of f .

4. **(Partition Numbers and Critical Values)** Find the partition numbers and critical values of the function $f(x) = \frac{1}{x-1}$.