Solution: Homework 9- MATH 2L03

Winter 2016

1. a) 0
   b) ∞
   c) $\frac{5}{2}$
   d) 1
   e) e^6

2. f' is continuous, $f(6) = 1$ and $f'(6) = 3$.

   Since f' is continuous, f is differentiable and therefore continuous.

   Since the function is continuous

$$\lim_{x\to 0} f(6+3x) = f(\lim_{x\to 0}(6+3x)) = f(6).$$

   Therefore, we have that

$$\lim_{x\to 0} \frac{f(6+3x) - f(6+x)}{2x} \text{ : Type } 0/0$$

   Then by L'Hospital's Rule

$$\lim_{x\to 0} \frac{3 \cdot f'(6+3x) - f'(6+x)}{2}$$
$$= \frac{3 \cdot 3 - 3}{2} = 3$$

3. (a) Infinite discontinuity at the left endpoint of the interval ($x = 1$).
   (b) Infinite interval
   (c) Infinite interval
   (d) Infinite discontinuity in the interval at $x = \frac{\pi}{2}$.

4. (a) 1
   (b) Divergent
   (c) Divergent