Math 100 Sample Test $1-{\rm Sep}~2018$

Question 1:

Let $P(x) = a^2 - x^2$ (*a* is a constant). Find the following

$$\lim_{h \to 0} \frac{P(x+h) - P(x)}{h}.$$

(b) Use your answer in part (a) to compute

$$\lim_{h \to 0} \frac{P(a+h) - P(a)}{h}.$$

Question 2 Find the following limits

(a)

$$\lim_{x \to -\infty} \frac{x^2 - 9}{-x - 3}.$$

(b)

 $\lim_{u \to 0} \frac{\tan u - \sin u}{\sin x}.$

(c)

$$\lim_{x \to 2} \frac{x^2 - 4}{x^2 + x - 6},$$

(d)

 $\lim_{a \to -1} \frac{\sqrt{a+2}-1}{a+1}.$

Question 3

Find all asymptotes of the graph

$$f(t) = \frac{t+3}{t^2 - 1}.$$

Question 4

Let

$$h(x) = x^2 - x$$

$$g(x) = \sqrt{2+x}$$

- (i) Find the domain and range of $g \circ h(x)$.
- (ii) Find the domain of $g \circ g(x)$.

Question 5:

Let

$$f(x) = 3\tan(x) - \cos(x).$$

Find the domain and range for f(x).

Let

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

Find the domain and range for g(x).

Question 6:

Compute

(i)
$$\lim_{x \to 2^{-}} \frac{x-2}{|x-2|}$$
.

(ii)

 $\lim_{x \to \pi/2} \frac{\cos x}{x - \pi/2}.$

Question 7:

Let

$$g(x) = \begin{cases} \frac{x^2 - b^2}{x - b} & \text{if } x \neq b\\ 0 & \text{if } x = b. \end{cases}$$

Does g(b) exist? Does $\lim_{x\to b} g(x)$ exist? Explain.