Calculus I Test # 1a Review **Prof.G.Buthusiem**

1. Find the limit.

   $$\lim_{x \to -5} 7x^2 + 35x$$

2. Find the limit.

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

3. Find the limit.

   $$\lim_{x \to \pi} \tan\left(\frac{4x}{3}\right)$$

4. Find the limit (if it exists):

   $$\lim_{x \to -14} \frac{-x - 14}{x^2 - 196}$$

5. Find the limit (if it exists).

   $$\lim_{x \to 2} \frac{\sqrt{x + 14} - 4}{x - 2}$$

6. Find the limit (if it exists).

   $$\lim_{x \to 0^-} f(x), \text{ where } f(x) = \begin{cases} x^3 + 8, & x < 0 \\ x + 8, & x \geq 0 \end{cases}$$
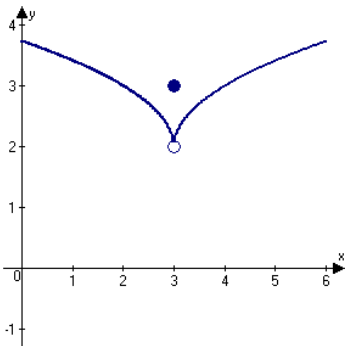
7. Determine the limit (if it exists).

   $$\lim_{x \to 0} \frac{-14(1 - \cos x)}{x}$$

8. Find the limit.

   $$\lim_{x \to 6^+} \frac{x - 7}{-x + 6}$$

9. Use the graph as shown to determine the following limits, and discuss the continuity of the function at $x = 3$.

   (i) $\lim_{x \to 3^+} f(x)$ (ii) $\lim_{x \to 3^-} f(x)$ (iii) $\lim_{x \to 3} f(x)$

10. Find constants a and b such that the function is continuous on the entire real line.

    $$f(x) = \begin{cases} 5, & x \leq -3 \\ ax + b, & -3 < x < 7 \\ -5, & x \geq 7 \end{cases}$$

11. Find the slope m of the line tangent to the graph of the function $g(x) = 4 - x^2$ at the point $(2, 0)$.

12. Find the derivative of the following function $f(x) = -2x^2 + 2x - 5$ using the limiting process.

Answer Key

1.   0
2. $\dfrac{2}{9}$
3. $\sqrt{3}$
4. $\dfrac{1}{28}$
5. $\dfrac{1}{8}$
6.   8
7.   0
8. ∞
9.   2 , 2 , 2 , not continuous
10. $a = -1$, $b = 2$
11. $m = -4$
12. $f'(x) = -4x + 2$