**Math 13 Gateway Exam Problems on Limits and Tangent Lines**

## Limits

1) $\lim_{t\to\infty} \dfrac{\sin t}{t}$

2) $\lim_{x\to 3} \dfrac{x^2-x-6}{x^2-6x+9}$

3) $\lim_{x\to 0} \dfrac{\sin x}{x}$

4) $\lim_{z\to -1} \dfrac{3z+5}{z^2+2z+1}$

5) $\lim_{\theta\to\infty} \cos\theta$

6) $\lim_{x\to 4} \dfrac{x^2-x-6}{x^2-6x+9}$

7) $\lim_{x\to\infty} \dfrac{\tan x}{x}$

8) $\lim_{w\to 2} \dfrac{w^2-w+1}{w^2-3w+2}$

9) $\lim_{x\to\infty} \dfrac{x^2-5x^3}{2x^3+5x-3}$

10) $\lim_{s\to 2^+} \dfrac{s^2-s+1}{s^2-3s+2}$

11) $\lim_{y\to-\infty} \dfrac{3y-7}{4y^2-9}$

12) $\lim_{t\to 2^-} \dfrac{t^2-t+1}{t^2-3t+2}$

13) $\lim_{x\to-\infty} \dfrac{x^2+4x+3}{x-5}$

14) $\lim_{\phi\to 1/4} \dfrac{\cos(\pi\phi)}{16\phi^2-8\phi+1}$

## Tangent Lines

In each problem find the equation of the line tangent to the graph of the function at the indicated point.

1) $f(x) = \dfrac{1}{x+1}$ at $x=5$

2) $g(x) = \sqrt{2x+3}$ at $x=4$

3) $h(x) = 2^{x-1}$ at $x=3$

4) $f(x) = \sin(\pi x/6)$ at $x=3$

5) $g(x) = \dfrac{1}{x^2+1}$ at $x=-2$

6) $h(x) = \log_7 x$ at $x=49$