1 wk 1.2

1) $\lim_{x \to 4} (x^2 - 4x + 1) = 16 - 16 + 1$
$= 1$

2) $\lim_{x \to 1} \frac{x+3}{x+6} = \frac{4}{7}$

3) $\lim_{x \to 1} \frac{x^2 - 1}{x+1} = \frac{0}{2}$
$= 0$

4) $\lim_{x \to 3} \frac{x^2 - 6x + 9}{x^2 - 9} = \frac{9 - 18 + 9}{0} = \frac{0}{0}$
$= \lim_{x \to 3} \frac{(x-3)(x-3)}{(x-3)(x+3)}$
$= \lim_{x \to 3} \frac{x-3}{x+3}$
$= \frac{0}{6}$
$= 0$

5) $\lim_{x \to 2} \frac{1}{4 - x^2} = \frac{1}{0} = \infty$

6) $\lim_{x \to 9} \frac{\sqrt{x} - 3}{x - 9} = \frac{3-3}{9-9} = \frac{0}{0}$
$= \lim_{x \to 9} \frac{\sqrt{x} - 3}{x - 9} \cdot \frac{\sqrt{x} + 3}{\sqrt{x} + 3}$
$= \lim_{x \to 9} \frac{(x-9)}{(x-9)(\sqrt{x} + 3)}$
$= \lim_{x \to 9} \frac{1}{\sqrt{x} + 3}$
$= \frac{1}{6}$

$\lim_{x \to 9} \frac{\sqrt{x} - 3}{(\sqrt{x} - 3)(\sqrt{x} + 3)}$

7/ $\lim_{x \to \pi} \frac{(x-\pi)^2}{\pi x} = \frac{0}{\pi^2} = 0$

8/ $\lim_{x \to 2} \frac{\sqrt{4-4x+x^2}}{x-2} = \frac{\sqrt{4-8+4}}{0} = \frac{0}{0}$

$= \lim_{x \to 2} \frac{\sqrt{(x-2)(x-2)}}{x-2}$ $\sqrt{(x-2)^2}$

$= \lim_{x \to 2} \frac{x-2}{x-2}$

$= 1$

9/ $\lim_{x \to 2} \frac{(x-2)^2}{x^2-4} = \frac{0}{0}$

$= \lim_{x \to 2} \frac{(x-2)^2}{(x-2)(x+2)}$

$= \lim_{x \to 2} \frac{x-2}{x+2}$

$= \frac{0}{4}$

$= 0$

10/ $\lim_{x \to 3} \frac{x-3}{x^2-9} = \frac{0}{0}$

$= \lim_{x \to 3} \frac{x-3}{(x-3)(x+3)}$

$= \lim_{x \to 3} \frac{1}{x+3}$

$= \frac{1}{6}$

11/ $\lim_{x \to \frac{2\pi}{3}} \sin x = \sin \frac{2\pi}{3}$

$= \frac{\sqrt{3}}{2}$

12/ $\lim_{x \to \frac{5\pi}{4}} \cos x = \cos \frac{5\pi}{4}$

$= -\frac{\sqrt{2}}{2}$

13/ $\lim_{x \to 0} \frac{\sin 2\pi x}{\sin 3\pi x} = \frac{0}{0}$

$= \lim_{x \to 0} \frac{2\pi x}{3\pi x} \frac{\sin 2\pi x}{2\pi x} \frac{1}{\frac{\sin 3\pi x}{3\pi x}} \to 1$

$= \frac{2}{3}$

14/ $\lim_{x \to 0^+} \frac{x - \sqrt{x}}{\sqrt{\sin x}} = \frac{0}{0}$ $\qquad \lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$

$= \lim_{x \to 0^+} \frac{x - \sqrt{x}}{\sqrt{x}\sqrt{\frac{\sin x}{x}}}$ $\qquad \sqrt{x} \cdot \frac{\sqrt{\sin x}}{\sqrt{x}}$

$= \lim_{x \to 0^+} \frac{\sqrt{x} - 1}{\sqrt{\frac{\sin x}{x}}} \to 1$

$= \frac{-1}{1}$

$= -1$

15/ $\lim_{x \to 0^+} \frac{\sin\sqrt{1-x}}{\sqrt{1-x^2}} = \frac{\sin 1}{1} = \sin 1$

$\lim_{x \to 1^+} \frac{\sin\sqrt{1-x}}{\sqrt{1-x^2}} = \frac{0}{0}$

$= \lim_{\sqrt{1-x} \to 0} \frac{\sin\sqrt{1-x}}{\sqrt{1-x}} \cdot \frac{1}{\sqrt{1+x}}$

$= \frac{1}{\sqrt{2}}$

16/ $\lim_{x \to 0} e^{x^2} = e^0 = 1$

17/ $\lim_{x \to 1} e^{x^2-1} = 1$

18/ $\lim_{x \to 1} \ln x = \ln 1 = 0$ $\qquad \ln 0^+ = -\infty$

19/ $\lim_{x \to 2} (e^x - \ln x) = e^2 - \ln 2$ $\qquad \ln \infty = \infty$

20/ $\lim_{x \to 1} \frac{1}{\ln x} = \frac{1}{0} = \infty$