④ $\lim_{x\to\frac{\pi}{2}} e^{\cos(x)} = e^{\lim_{x\to\frac{\pi}{2}}\cos(x)} = e^{\cos(\frac{\pi}{2})} = e^0 = \boxed{1}$

⑥ $\lim_{x\to 1} \ln\left(\frac{x^2-1}{2x-2}\right) = \ln\left(\lim_{x\to 1}\frac{x^2-1}{2x-2}\right)$

$= \ln\left(\lim_{x\to 1}\frac{(x-1)(x+1)}{2(x-1)}\right) = \ln\left(\lim_{x\to 1}\frac{x+1}{2}\right)$

$= \ln\left(\frac{1+1}{2}\right) = \ln(1) = \boxed{0}$

⑫ State the intervals on which $y = \frac{\sqrt{x+5}}{e^x-1}$ is continuous.

The domain of this function is $[-5,0)\cup(0,\infty)$ (Because we require $x+5 \geq 0$ and $e^x \neq 1$) By Theorem 11.3 the function is also continuous on $[-5,0)\cup(0,\infty)$

⑯ Draw the graph of a function that meets all 5 of these criteria.

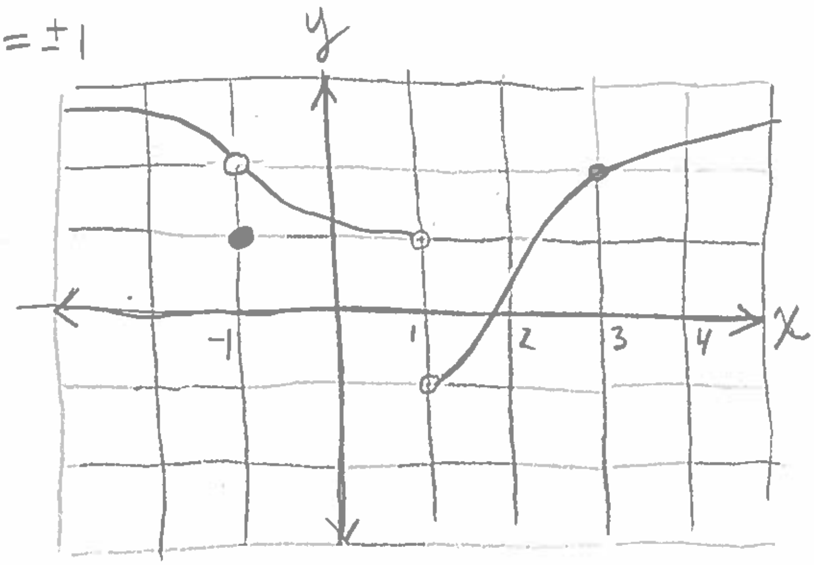
① Continuous except at $x = \pm 1$

② $f(3)=2$

③ $\lim_{x\to -1} f(x) = 2$

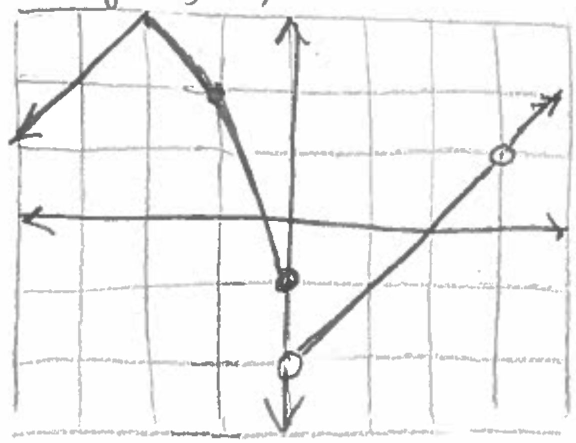
④ $\lim_{x\to 1^-} f(x) = 1$

⑤ $\lim_{x\to 1^+} f(x) = -1$



Ch 10 Continued

(22)



(a) f is not continuous at $x = 0$ and $x = 3$.

(b) $\lim\limits_{x \to 2} f\left(\frac{x^2-4}{x-2}\right)$

$= f\left(\lim\limits_{x \to 2} \frac{x^2-4}{x-2}\right)$

$= f\left(\lim\limits_{x \to 2} \frac{(x-2)(x+2)}{x-2}\right) = f\left(\lim\limits_{x \to 2}(x+2)\right) = f(4) = \boxed{2}$

(c) $\lim\limits_{x \to -1} \frac{(f(x))^2-4}{f(x)-2} = \lim\limits_{x \to -1} \frac{\cancel{(f(x)-2)}(f(x)+2)}{\cancel{f(x)-2}}$

$= \lim\limits_{x \to -1} (f(x)+2) = 2 + 2 = \boxed{4}$

(d) $\lim\limits_{x \to 3} f \circ f(x) = \lim\limits_{x \to 3} f(f(x)) =$

$f\left(\lim\limits_{x \to 3} f(x)\right) = f(1) = \boxed{-1}$

(e) $\lim\limits_{x \to 3} \frac{5f(x)}{1+f(x)} = \frac{\lim\limits_{x \to 3} 5f(x)}{\lim\limits_{x \to 3}(1+f(x))}$

$= \frac{5 \cdot 1}{1+1} = \boxed{\frac{5}{2}}$