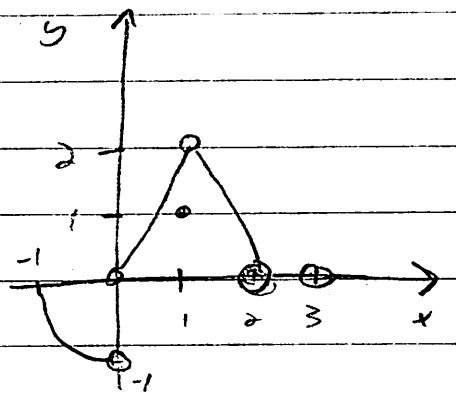
2.6 5-10, 15, 16, 31, 32, 53, 56

$$f(x) = \begin{cases} x^2 - 1, & -1 \le x < 0 \\ 2x & 0 < x < 1 \\ 1 & x = 1 \\ -2x + 4 & 1 < x < 2 \\ 0 & 2 < x < 3 \end{cases}$$



5) a) $f(-1)$ exists, $f(-1) = 0$

b) $\lim_{x \to -1^+} f(x)$ exist, $= 0$

c) $\lim_{x \to -1^+} f(x) = f(-1)$, yes

d) f cont. at $x = -1$, yes

6) a) $F(1)$ exists, $F(1) = 1$

b) $\lim_{x \to 1} F(x)$ exists, $= 2$

c) $\lim_{x \to 1} F(x) \neq f(1)$

d) F not cont at $x = 1$

7) a) F not defined at 2

b) F not cont. at 2

31) $\lim_{y\to 1} \sec\left(y\sec^2 y - (\tan^2 y - 1)\right)$

$= \sec\left(\lim_{y\to 1} y \cdot \sec^2(\lim_{y\to 1} y) - (\tan^2(\lim_{y\to 1} y) - 1\right)$

(because sec, tan cont functions)

$= \sec\left(1 \cdot \sec^2(1) - \tan^2(1) - 1\right)$

$= \sec\left(\underbrace{\sec^2(1) - \tan^2(1)} - 1\right)$

$= 1$

$= \sec(0) = \frac{1}{\cos(0)} = 1$

continuous

32) $\lim_{x\to 0} \tan\left(\frac{\pi}{4}\cos\left(\sin\left(x^{1/3}\right)\right)\right)$

$= \tan\left(\lim_{x\to 0} \frac{\pi}{4}\cos\left(\sin(x^{1/3})\right)\right)$

$\because \tan x$ cont at $x=0$

$= \tan\left(\frac{\pi}{4}\cos\left(\sin\left(\lim_{x\to 0}(x)^{1/3}\right)\right)\right)$

$\because \frac{\pi}{4}$ constant, $\cos x$, $\sin x$, $x^{1/3}$ cont at $x=0$

$= \tan\left(\pi/4\cos\left(\sin\left(0^{1/3}\right)\right)\right) = \tan\pi/4 = 1$, cont.

53 b) No, for some reason

56)

$g(x) = 1$ cont at $x=0$

$f(x) = \frac{1}{x-1}$ cont at $x=0$

$f(g(1))$ is undefined, so $f \circ g$ can't be continuous at $x=1$.