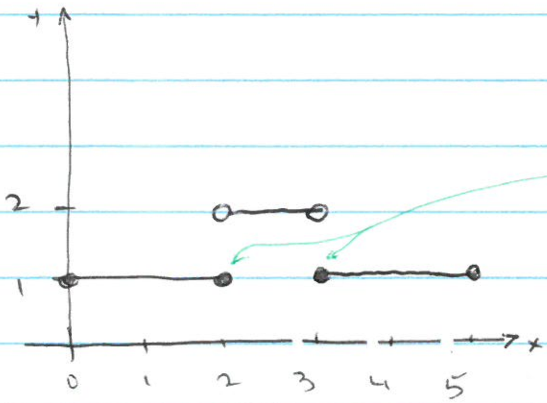
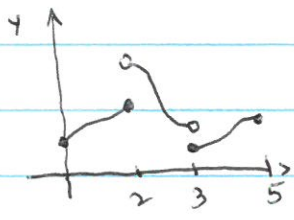
2; 3; 2; 3 total 10

MATH 135 Problem Set 3, Part B Solutions

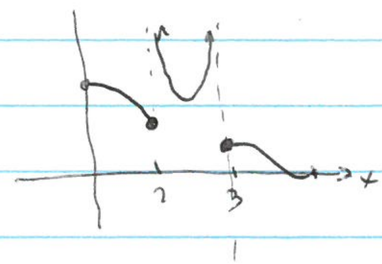
§ 2.4 / 64 One such function is



(2) Any graph with discontinuities at 2, 3, but solid dots as shown here is OK. Don't get too picky. The segments of the graph do not need to be parts of lines. For instance



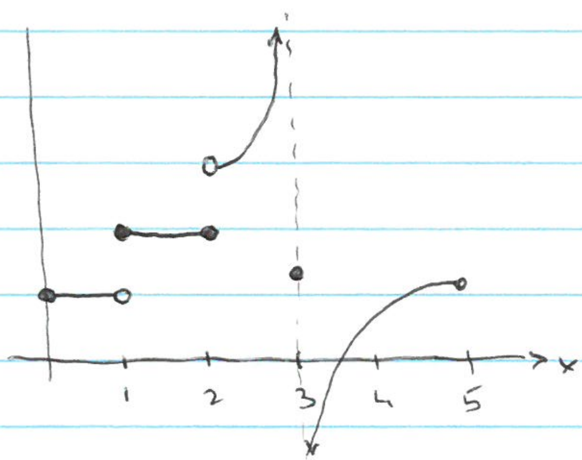
OK



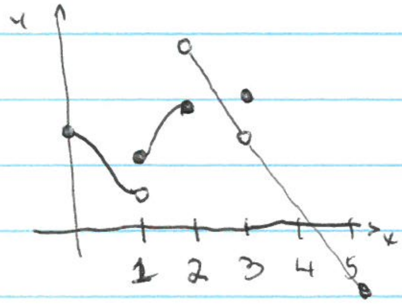
Also OK

(-1) if there are two solid dots at the discontinuities say "fails vertical line test"

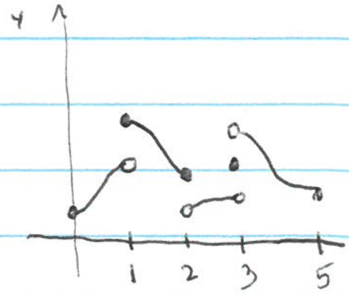
§ 2.4 / 66 One such function is :



(3) Any graph with discontinuities at 1, 2, 3 is OK. The discontinuity at $x=3$ can also be removable or a jump (defn) as long as it's neither right- nor left-continuous at $x=3$



OK



Also OK

§2.5 / 56. $\lim_{x\to 1} \frac{x^2+3x+C}{x-1}$ exists when $\lim_{x\to 1} x^2+3x+C=0$

so this is a $\frac{0}{0}$ indeterminate form. Otherwise there is an infinite discontinuity. $1^2+3\cdot 1+C=0$ when $\boxed{C=-4}$. 2

(the limit then is $\lim_{x\to 1} \frac{\cancel{(x-1)}(x+4)}{\cancel{x-1}} = \lim_{x\to 1} x+4 = 5$.)

§2.6 / 42

$$\lim_{x\to 0} \frac{\cancel{\sin(5x)}\sin(2x)}{\sin(3x)\cancel{\sin(5x)}} = \lim_{x\to 0}\frac{\sin(2x)}{\sin(3x)}$$ 1

(as long as $\sin 5x \neq 0$ which is true on a deleted interval about $x=0$)

$$= \lim_{x\to 0} \frac{\frac{\sin(2x)}{2x}\cdot 2}{\frac{\sin(3x)}{3x}\cdot 3}$$ 1

$$= \frac{\lim_{x\to 0}\frac{\sin(2x)}{2x}\cdot 2}{\lim_{x\to 0}\frac{\sin(3x)}{3x}\cdot 3}$$

total 3

It's OK if they just say $\lim_{x\to 0}\frac{\sin(2x)}{x}=2$ etc.

$$= \frac{1\cdot 2}{1\cdot 3}$$

$$= \boxed{\frac{2}{3}}$$ 1

It's also OK if the $\sin 5x$ factors are not cancelled and $\lim_{x\to 0}\frac{\sin(5x)}{x}=5$ is used on those