MATH 1210: HOMEWORK SOLUTIONS §1.6

1. continuous

3. not continuous since h is not defined at 3.

5. " " " h " " " 3.

7. continuous.

9. not continuous since h is not defined at 3.

11. $$\lim_{t\to 3} \frac{t^3-27}{t-3} = \lim_{t\to 3} \frac{(t-3)(t^2+t+9)}{t-3} = \lim_{t\to 3} t^2+t+9 = 21 \neq f(3).$$

<u>not</u> continuous.

13. $$\lim_{t\to 3^-} f(t) = \lim_{t\to 3^-} t-3 = 0$$
$$\lim_{t\to 3^+} f(t) = \lim_{t\to 3^+} 3-t = 0$$
$$\Rightarrow \lim_{t\to 3} f(t) = 0 = f(3)$$

<u>continuous.</u>

15. $\lim_{x\to 3^+} f(x) = 2.$ $\lim_{x\to 3^-} f(x) = \lim_{x\to 3^-} -3x+7 = 1.$

Not continuous since $\lim_{x\to 3} f(x) = DNE.$

17. h is cont. on $[-5,4]$ and $(4,6)$ and $[6,8]$ and $(8,\infty)$

19. $$\frac{2x^2-18}{3-x} = \frac{2(x+3)(x-3)}{(3-x)} = \frac{-2(x+3)\cancel{(x-3)}}{\cancel{(x-3)}} = -2(x+3)$$

Define $f(3) = -2(3+3) = \boxed{-12}$

21. $\dfrac{\sqrt{t}-1}{t-1} = \dfrac{\sqrt{t}-1}{t-1} \cdot \left(\dfrac{\sqrt{t}+1}{\sqrt{t}+1}\right) = \dfrac{t-1}{(t-1)\sqrt{t}+1}$

Define $H(1) = \dfrac{1}{\sqrt{1}+1} = \dfrac{1}{2}$.

23. $\sin\left(\dfrac{x^2-1}{x+1}\right) = \sin\left(\dfrac{(x+1)(x-1)}{x+1}\right)$

Define $F(-1) = \sin(-1-1) = \sin(-2)$

25. $f(x) = \dfrac{33-x^2}{x\pi + 3x - 3\pi - x^2} = \dfrac{33-x^2}{(-x+3)(x-\pi)}$

discontinuous at $x = 3, \pi$

27. $r(\theta) = \tan\theta = \dfrac{\sin\theta}{\cos\theta}$. Discontinuous whenever $\cos\theta = 0$, i.e., at $\theta = \dfrac{\pi}{2} + n\pi$, $n \in \mathbb{Z}$

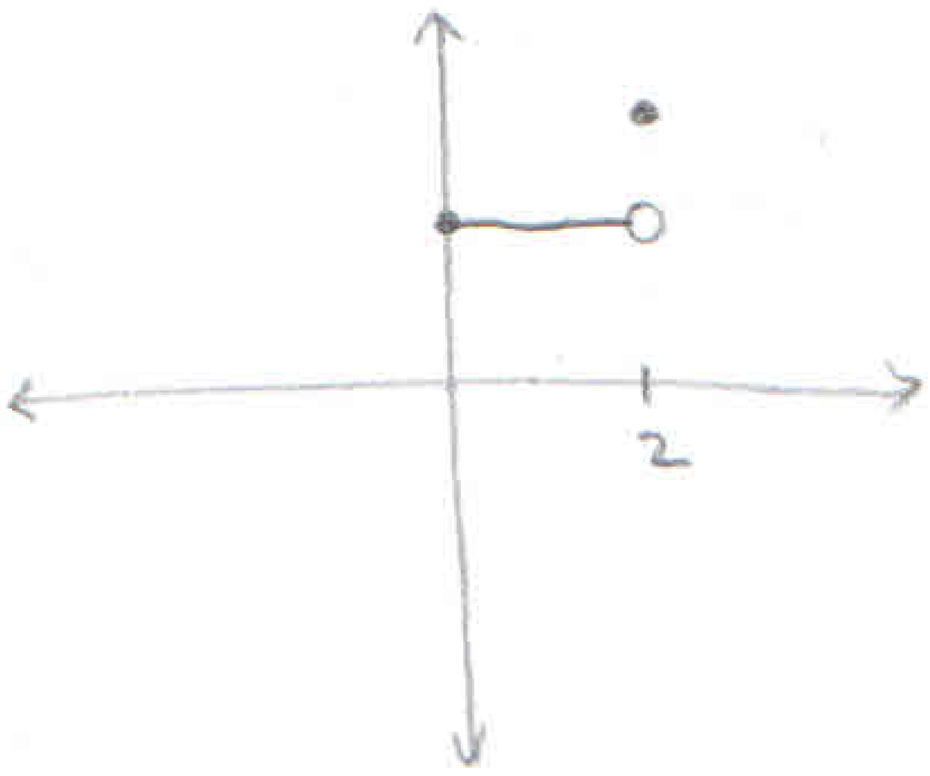
29. $g(u) = \dfrac{u^2 + |u-1|}{\sqrt[3]{u+1}}$. Discontinuous whenever $\sqrt[3]{u+1} = 0$, which is at $u = -1$.

31. $G(x) = \dfrac{1}{\sqrt{4-x^2}}$. Discontinuous on $(-\infty, -2] \cup [2, \infty)$

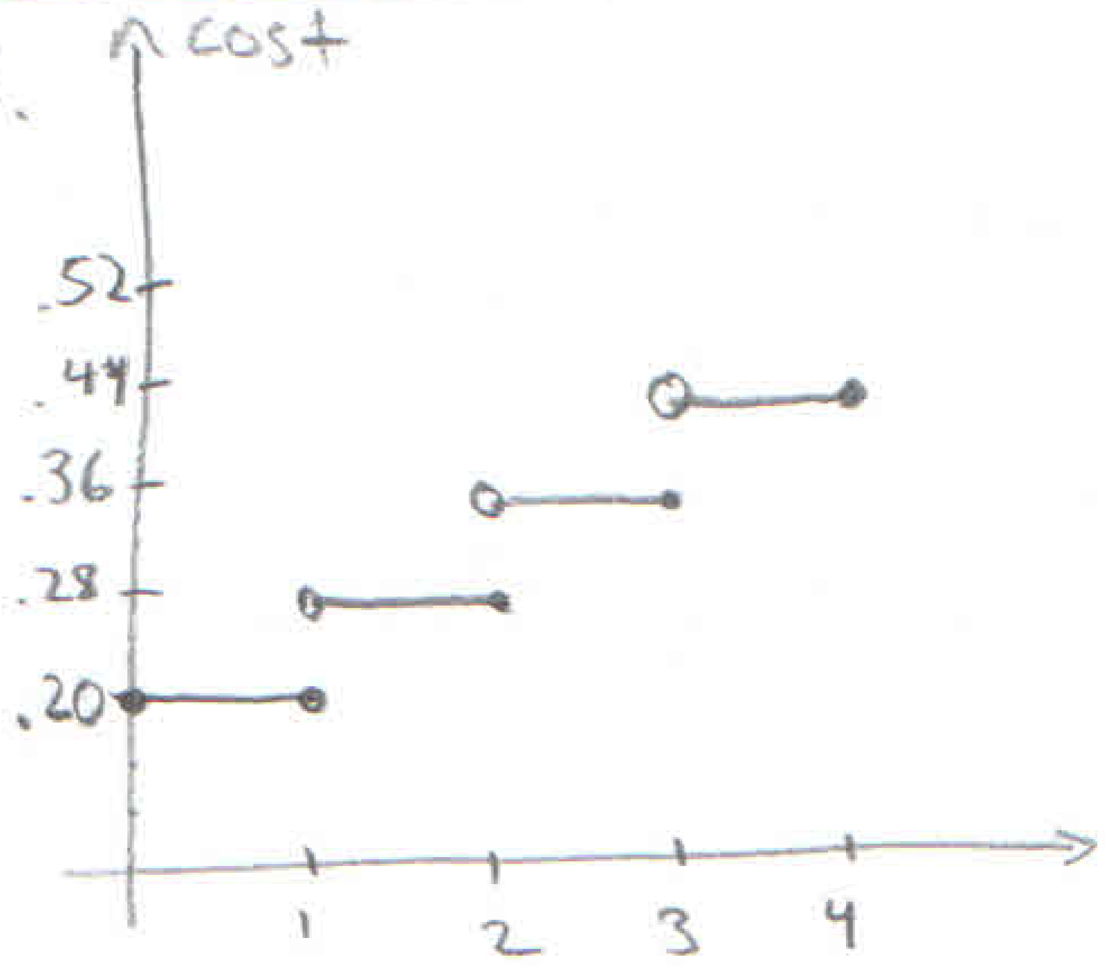
33. $g(x) = \begin{cases} x^2 & x<0 \\ -x & 0 \le x \le 1 \\ x & x>1 \end{cases}$. Discontinuous at $x = 1$.

35. Discontinuous whenever $[\![t+\frac{1}{2}]\!] \in \mathbb{Z}$, so when $t = \frac{1}{2} + n$, $n \in \mathbb{Z}$.

37.



49.



Discontinuous at integer times.