Calculus AB
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23) 3
24) 2
25) ∅
26) 2
59) nonremovable on $\mathbb{Z}$
60) nonremovable on $\mathbb{Z}$
63) 7
65) 2
67) $a = -1$, $b = 1$
69) continuous on $\mathbb{R}$
71) nonremovable at $x = \pm 1$
77) $\mathbb{R}$
78) $[-3, \infty)$
79) $\mathbb{R}$ except $\{2 + 4n, n \in \mathbb{Z}\}$
80) $(0, \infty)$

83) $f(1) = 3.083$
$f(2) = -2.667$
By the intermediate value theorem, $f(x) = 0$ on $[1,2]$
91) $f(3) = 11$
93) $f(2) = 4$
95) a) limit D.N.E. at $x = c$
b) $f(c)$ is undefined
c) $f(c)$ does not equal the limit as $x \to c$
d) limit D.N.E. at $x = c$
96) sketches will vary
It is not continuous because the right and left limits differ.
97) No, it will be discontinuous when $g = 0$.

107) $s(t)$ = position up and $r(t)$ = position down. Let z = height of summit.

let $f(t) = s(t) - r(t)$

Since he leaves at time $t = 0$, $s(0) = 0$
Since it takes him 20 minutes to the summit, $s(\frac{1}{3}) = z$.

Saturday, he leaves at the same time, so at $t = 0$, $r(0) = z$.
Since it takes him 10 minutes to get back, $r(\frac{1}{6}) = 0$
Since he is back to ground level, at $r(\frac{1}{3}) = 0$ still.

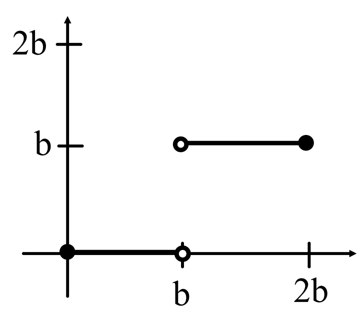
For $f(t)$ to equal 0, $s(t)$ must equal $r(t)$ at some time t.

Unless he can teleport, $f(t)$ must be continuous.

Then, $f(0) = -z$ and $f(\frac{1}{3}) = z$.
Since f is continous, and f changes from positive to negative,
then $f = 0$ at some time t and $s(t) = r(t)$ at that time

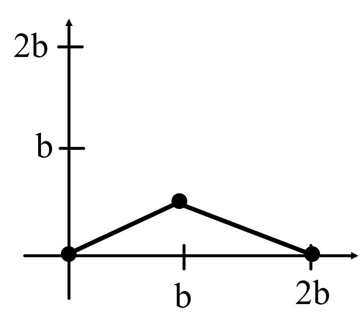
114) a) $f(x) = \begin{cases} 0, & x \in [0, b) \\ b, & x \in (b, 2b] \end{cases}$

not continuous at b



b) $g(x) = \begin{cases} \frac{x}{2}, & x \in [0, b] \\ b - \frac{x}{2}, & x \in (b, 2b] \end{cases}$

continuous



25) $\lim_{x \to 3} \left(2 - [\![-x]\!]\right)$

$2 - [\![-3.1]\!] = 6$

$2 - [\![-2.9]\!] = 5$

63) $f(x) = \begin{cases} 3x^2 & x \geq 1 \\ ax - 4 & x < 1 \end{cases}$

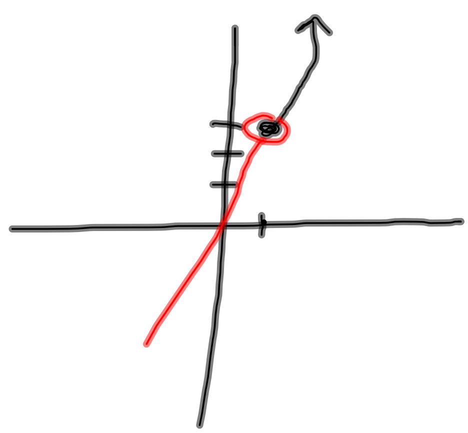
$f(1) = 3(1)^2 = 3$

$ax - 4 = 3$

$ax = 7$

$a(1) = 7$

$a = 7$



67)

$$F(x) = \begin{cases} 2 & x \le -1 \\ ax+b & -1 < x < 3 \\ -2 & x \ge 3 \end{cases}$$

$a(-1)+b=2$ $\quad$ $a(3)+b=-2$

(-1)

$-a+b=2$

$-3a-b=2$

$-4a = 4$

$$\boxed{\begin{array}{l} a=-1 \\ b=1 \end{array}}$$