Cal I (S) (Maths 201–NYA)

Answers

1. (a) $-\frac{5}{2}$ (b) -5 (c) $-2^- : +\infty;\ -2^+ : -\infty$
   (d) $\frac{2}{3}$ (e) $\frac{3}{2}$ (f) $\frac{5}{7}$ (g) 0

2. HA: $y = -\frac{2}{7}, \frac{4}{7}$. VA: $x = 0, 2$

3. Discontinuous at $x = \frac{1}{2}$ (not removable), and at $x = 2$ (removable: make $f(2) = \frac{5}{3}$).

4. $a = \frac{1}{3}$

5. Discontinuous at $x = \pm\frac{1}{3}$; removable at $\frac{1}{3}$; a vertical asymptote at $-\frac{1}{3}$.
   The function $\dfrac{x-1}{3x+1}$ removes the discontinuity at $x = \frac{1}{3}$.

6. (a) Any continuous function with a sharp change in slope at $x = 0$.
   (b) Any otherwise continuous function with a "hole" at $x = 0$.
   (c) Impossible (differentiable implies continuous).

7. -0.729 m/s

8. 65 km/hr

9. min: -0.38 at $x = -\frac{2}{3}$; max: 1.41 at $x = 1$.

10. As $x \to 0$, $f(x) \to -\infty$, so f has no absolute minimum. (Actually, as $x \to -\infty$, $f(x) \to -\infty$ also.) As $x \to \infty$, $f(x) \to \infty$, so f has no absolute maximum.

Let me know if you think any of these answers is incorrect or unclear.