Cal I (S) (Maths 201–NYA)

Answers

NYA Cal I — Quiz 3

1. The first clause is undefined at $x = -2$, ($x = 3$ is not relevant), and there we have a removable discontinuity. At the "join" $x = -1$ we have the first and second clauses both $\to \frac{3}{4}$, hence continuity at $x = 1$. At the "join" $x = 5$ we have a jump discontinuity, since the left and right limits disagree (they are $-1/49$ and $9/4$). And since $x^2 - 10x - 24 = (x - 12)(x + 2)$, we have a VA (an infinity discontinuity) at $x = 12$.

2. At $x = 3$ the two clauses are equal (and g continuous) if $\sqrt{1/k} = 1/(k - 2)$, so $k^2 - 5k + 4 = 0$, which suggests $k = 1, 4$. But $k = 1$ would be impossible, since $\sqrt{1/1} \neq 1/(-1)$. So $k = 4$.

3. At points c, e, f is continuous and differentiable. At point d, f is continuous, but not differentiable. At points a, b, f is neither continuous nor differentiable.

4. Since the slope is at most 2, the maximum growth over 3 units is $2 \times 3 = 6$: hence the maximum value of $f(3)$ is 10.

5. (a) can be any continuous graph with an "abrupt" change in direction at $x = 0$; (b) is impossible (differentiable implies continuous); (c) can be any otherwise continuous graph with a "hole" at $x = 0$.