Question 3 Rubric

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(a) The breakup of points is as follows:

- To show full comprehension of continuity in this course I need to see the following stated:

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^+} f(x) = f(2)$$

  You could also argue that since both of the components of $f(x)$ are polynomials, each component is continuous on its domain. Thus, the left and right limits exist and you only have to check that $f_1(2) = f_2(2)$ to ensure continuity where:

$$f(x) = \begin{cases} f_1(x) = cx^2 + 2x, & x < 2 \\ f_2(x) = x^3 - cx, & x \geq 2 \end{cases} \quad \text{or} \quad f(x) = \begin{cases} f_1(x) = cx^2 + 3x, & x < 2 \\ f_2(x) = x^3 + cx, & x \geq 2 \end{cases}$$

  depending upon which version of the test you had. This will be worth a total of $\boxed{\text{5 points}}$ where partial credit may be given depending upon how much of the above is present.

- The rest of the $\boxed{\text{5 points}}$ rely upon your ability to determine the value of c. For the white version you should have:

$$4c + 4 = 8 - 2c \implies c = \frac{2}{3}$$

  and for blue:

$$4c + 6 = 8 + 2c \implies c = 1$$

  Writing down the equation to solve provides 3 points while the other 2 points come from writing down the correct value of c.

(b) The breakup of points is as follows:

- To show full comprehension of the Intermediate Value Theorem I need to see the statement of the theorem either written down somewhere or have at least the answer written in a form that shows clearly your understanding of the theorem. For example a statement like, "*With $g(1) < 0 < g(2)$ there must exist a corresponding value $1 < k < 2$ such that $g(k) = 0$ by the IVT*" is acceptable. This will be worth a total of $\boxed{\text{5 points}}$ and there will not be partial credit since you either understand the theorem fully or not at all.

- The rest of the $\boxed{\text{5 points}}$ rely upon your ability to correctly show that $g(1) < 0 < g(2)$. For the white version you should have:

$$g(x) = 4x^3 - 6x^2 + 3x - 2 \implies g(1) = -1 \quad \text{and} \quad g(2) = 12$$

  and for blue:

$$g(x) = x^4 + x - 3 \implies g(1) = -1 \quad \text{and} \quad g(2) = 15$$

  There will be no partial credit to this part since you either attain the correct values for the function at the endpoints or not.