

Name: \_\_\_\_\_ Score: \_\_\_\_\_

Teacher: \_\_\_\_\_ Date: \_\_\_\_\_

## Intermediate value theorem

For questions 1 - 6, use the Intermediate Value Theorem to show that the given equation has at least one solution in the indicated interval. Note that you are NOT asked to find the solution only show that at least one must exist in the indicated interval.

1.  $25 - 8x^2 - x^3 = 0$  on  $[-2, 4]$

2.  $w^2 - 4 \ln(5w + 2) = 0$  on  $[0, 4]$

3.  $4t + 10e^t - e^{2t} = 0$  on  $[1, 3]$

4.  $f(x) = \frac{1}{16}x^4 - x^3 + 3$ ;  $[1, 2]$

5.  $f(x) = x^3 + 3x - 2$ ;  $[0, 1]$

6.  $f(x) = x^2 - x - \cos x$ ;  $[0, \pi]$

In 7- 9, verify that the Intermediate Value Theorem guarantees that there is a zero in the interval  $[0, 1]$  for the given function. Use a graphing calculator to find the zero.

7.  $f(x) = x^3 + x - 1$

8.  $f(x) = x^3 + 3x - 2$

9.  $g(t) = 2 \cos t - 3t$

In questions 10 – 12, verify that the Intermediate Value Theorem applies to the indicated interval and find the value of  $c$  guaranteed by the theorem.

10.  $f(x) = x^2 + x - 1$ ,  $[0, 5]$ ,  $f(c) = 11$

11.  $f(x) = x^2 - 6x + 8$ ,  $[0, 3]$ ,  $f(c) = 0$

12.  $f(x) = \frac{x^2 + x}{x - 1}$ ,  $\left[\frac{5}{2}, 4\right]$ ,  $f(c) = 6$