

Quiz5, MAT1375 Professor Chiu

ID: _____

Name: Sol.

- This quiz consists of 2 sets of questions for a total of 10 points.
- You have 15 minutes to complete the quiz.
- Wishing you success.

True or False. Circle your answers (either T (true) or F (false)) on this sheet.

1. (T / F) If f has a complex root c , then its conjugate $\bar{c}$ is also a root of f .
2. (T / F) Odd-degree polynomial functions have graphs with opposite behavior at each end.
3. (T / F) A root of a polynomial $f(x)$ appears as the y -intercept of the graph of $f(x)$.
4. (T / F) Given $f(x) = x^3 + 7x^2 + 7x - 15$. Then $x = 1$ is a root of f .
5. (T / F) If f is a degree 3 polynomial, then it is possible for f to have two real roots and one complex root.

Show all your work and justify your answer:

6. Work out the following problems about the polynomial function $f(x) = -3(x-1)^3(2x+4)^2$.

- (1.)(2pt) Find the leading term of $f(x)$. Using the leading coefficient test to determine the **end behavior** of $f(x)$

$$f(x) = \underbrace{-3}_{\text{leading coeff}} \underbrace{(x-1)}_{\text{root}} \underbrace{(x-1)}_{\text{root}} \underbrace{(x-1)}_{\text{root}} \underbrace{(2x+4)}_{\text{root}} \underbrace{(2x+4)}_{\text{root}}$$

$$\text{leading term} = -3 \cdot x \cdot x \cdot x \cdot 2x \cdot 2x = -12x^5$$

$$\text{leading coefficient} = -12$$

End behavior, since lead term has odd degree and negative coefficient,
then if $x \rightarrow -\infty$, $f(x) \rightarrow \infty$ and if $x \rightarrow \infty$, $f(x) \rightarrow -\infty$ (or $(\nearrow, \searrow)$)

- (2.)(2pt) Find the **zeros** of $f(x)$ and their **multiplicities**.

The zero of $f(x)$ is an input x which will make $f(x) = 0$

$$\Rightarrow f(x) = -3(x-1)^3(2x+4)^2 = 0 \Rightarrow x=1 \text{ or } -2$$

multiplicity: 3 2
(How many times it repeats)

- (3.)(1pt) Find the **y**-intercept of $f(x)$.

a y -intercept of $f(x)$ is finding the output when $x = 0$

$$\begin{aligned} \Rightarrow f(0) &= -3(0-1)^3(2 \cdot 0 + 4)^2 \\ &= -3(-1)^3(4)^2 = 48. \end{aligned}$$