

Quiz6, 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 ^{x-intercept} 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 . $f(1) = 0$.
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 $f(x)$

$$f(x) = -3(x-1)(x-1)(x-1)(2x+4)(2x+4)$$

leading term (which has the most "x")

$$= -3x \cdot x \cdot x \cdot 2x \cdot 2x$$

$$= -12x^5$$

End behavior if leading term = $-12x^5$

deg(f) = 5. (odd number)

leading coefficient: $-12 < 0$

$\Rightarrow x \rightarrow \infty, f(x) \rightarrow -\infty$
 $x \rightarrow -\infty, f(x) \rightarrow \infty$

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

$$f(x) = -3(x-1)^3(2x+4)^2 = 0 \Rightarrow (x-1)=0, (x-1)=0, (x-1)=0, (2x+4)=0, (2x+4)=0$$

$$\Rightarrow x=1, x=1, x=1, x=-2, x=-2$$

zeros of $f(x)$: 1 and -2

multiplicity: 3 \nwarrow repeat 3 times, 2 \nwarrow repeat 2 times.

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

\hookrightarrow when $x=0$, $f(x) = ?$

$$f(0) = -3(0-1)^3(2 \cdot 0 + 4)^2 = -3 \cdot (-1)^3(4)^2 = -3 \cdot 1 \cdot 16 = -48$$

\Rightarrow y-intercept is $(0, -48)$