

# 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 <sup>x-intercept</sup> 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  $x=0$ ,  $f(x) = ?$

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

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