

# Quiz 4

Math 3C: Precalculus

October 31, 2019

When you finish, please remain seated until class is dismissed

Name: Solutions

PID: \_\_\_\_\_

**Problem 1** (3 points). Let  $p(z) = 2z^2 + 3z - 2$ . Find the horizontal intercepts of  $p(z)$  using the quadratic formula. Simplify as much as possible.

$$\begin{aligned} z &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-3 \pm \sqrt{(-3)^2 - 4(2)(-2)}}{2 \cdot 2} \\ &= \frac{-3 \pm \sqrt{9 - (-16)}}{4} \\ &= \frac{-3 \pm \sqrt{25}}{4} \end{aligned}$$

$\frac{-3 \pm 5}{4}$   
 $\downarrow$   
 $\frac{-3+5}{4}$  or  $\frac{-3-5}{4}$   
 $\frac{2}{4}$  or  $\frac{-8}{4}$   
So  $z = \frac{1}{2}$  or  $z = -2$

**Problem 2** (7 points). Let  $f(x) = -2(x+1)(x-1)^2(x-2)$ . Another way of writing  $f(x)$  is  $f(x) = -2x^4 + 6x^3 - 2x^2 - 6x + 4$ .

(a) What is the long-run behavior of  $f(x)$ ?

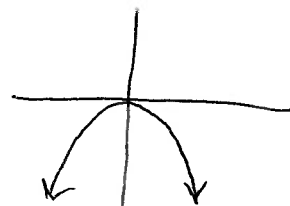
Long-run behavior of  $f(x)$  matches long run behavior of leading term:  $-2x^4$

$$\begin{aligned} f(x) &\rightarrow -\infty \text{ as } x \rightarrow -\infty \text{ and} \\ f(x) &\rightarrow -\infty \text{ as } x \rightarrow \infty \end{aligned}$$

(b) What is the vertical intercept of  $f(x)$ ?

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

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(c) What are the horizontal intercepts (zeros) of  $f(x)$ ?

$$x = -1$$

$$x = 1$$

$$x = 2$$

(d) What are the multiplicities of the zeros you found in part (c)?

$$x = -1 \longrightarrow 1$$

$$x = 1 \longrightarrow 2$$

$$x = 2 \longrightarrow 1$$

(e) Sketch a graph of  $f(x)$ . Be sure to label the vertical and horizontal intercepts.

