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 $p(z) = 3z^2 + 8z - 3$. Find the horizontal intercepts of $p(z)$ using the quadratic formula. Simplify as much as possible.

$$z = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-8 \pm \sqrt{8^2 - 4(3)(-3)}}{2 \cdot 3}$$

$$= \frac{-8 \pm \sqrt{64 - (-36)}}{6}$$

$$= \frac{-8 \pm \sqrt{100}}{6}$$

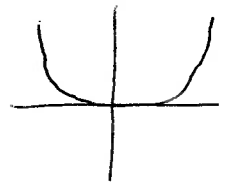$$= \frac{-8 \pm 10}{6}$$

$$= \frac{-8 + 10}{6} \quad \text{or} \quad \frac{-8 - 10}{6}$$

$$= \frac{2}{6} \quad \text{or} \quad \frac{-18}{6}$$

$$\Rightarrow \underline{z = \frac{1}{3}} \quad \text{or} \quad \underline{z = -3}$$

Problem 2 (7 points). Let $f(x) = (x + 1)^3(x - 1)^2(x + 2)$. Another way of writing $f(x)$ is $f(x) = x^6 + 3x^5 - 6x^3 - 3x^2 + 3x + 2$

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

Long-run behavior matches the leading term, x^6

So $f(x) \to \infty$ as $x \to -\infty$ and
$f(x) \to \infty$ as $x \to \infty$

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

$$f(0) = (0+1)^3(0-1)^2(0+2) = 1^3 \cdot (-1)^2 \cdot 2 = \underline{\underline{2}}$$

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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)?

$$X = -1 \longrightarrow 3$$
$$X = 1 \longrightarrow 2$$
$$X = -2 \longrightarrow 1$$

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