R University
Statistics Exam 2022-02-26   Exam ID 00001

Name: _____

Student ID: _____

Signature: _____

1. (a) ☐   (b) ☐   (c) ☐   (d) ☐

2. ☐☐☐☐☐☐ . ☐☐☐

3. _____

4. _____

1. Consider the polynomial function below.

$$f(x) = 3x^3 + 7x + 9$$

Multiple choice: describe the end behavior.

   (a) Down-down: when $x \to -\infty$ then $f(x) \to -\infty$ and when $x \to \infty$ then $f(x) \to -\infty$.
   (b) Up-down: when $x \to -\infty$ then $f(x) \to \infty$ and when $x \to \infty$ then $f(x) \to -\infty$.
   (c) Down-up: when $x \to -\infty$ then $f(x) \to -\infty$ and when $x \to \infty$ then $f(x) \to \infty$.
   (d) Up-up: when $x \to -\infty$ then $f(x) \to \infty$ and when $x \to \infty$ then $f(x) \to \infty$.

2. Consider the polynomial function below.

$$f(x) = -2x^7 - 4x^5 + 8x^3 + 7x - 6$$

How many roots, including complex roots and counting multiplicity, does the polynomial have?

Or, in other words, based on the degree of the polynomial, what is the most number of possible real roots?

3. **Draw** the polynomial function $f(x)$ shown in factored and expanded forms. Be sure to indicate the roots, where the function is positive or negative, and end behavior.

$$f(x) = 3(x - 4)(x - 3)^2(x + 2)(x + 5)$$

$$f(x) = 3x^5 - 9x^4 - 81x^3 + 285x^2 + 234x - 1080$$

4. Factor the polynomial function $f(x)$ to determine the roots.

$$f(x) = -x^3 + x^2 + 14x - 24$$