

Math-19 Exam #2

Name: _____

This exam is closed book and notes. You may use a calculator; however, no cell phones or tablets are allowed. Show all work; there is no credit for guessed answers. All values should be exact unless you are specifically asked for an approximate value answer. In particular, trig answers should be left in terms of π unless otherwise directed.

- 1). Consider the following polynomial function:

$$f(x) = x^6 - 8x^5 + 17x^4 + 6x^3 - 44x^2 + 8x + 32$$

- a). Completely factor it into linear factors. It must be *clear* how you obtained candidate factors, determined that they are indeed factors, and how you reduced the problem for each found factor (i.e., long or synthetic division).

b). What is the end behavior as $x \rightarrow \infty$?

c). What is the end behavior as $x \rightarrow -\infty$?

d). What are the x-intercepts (if any)?

e). What are the y-intercepts (if any)?

f). Sketch a graph of the function. You must show and label all zeros and intercepts and show the proper behavior and shape at each zero. Your sketch need not be to scale.

2). Consider the following rational function:

$$f(x) = \frac{x^2 + 3x - 4}{x^3 - x^2 - 6x}$$

- a). What are the zeros (if any)?

- b). What are the vertical asymptotes (if any)?

- c). What are the horizontal asymptotes (if any)?

- d). What is the end behavior for $x \rightarrow +\infty$? If it is asymptotic, be sure to indicate whether the asymptote is approached from below or above and why.

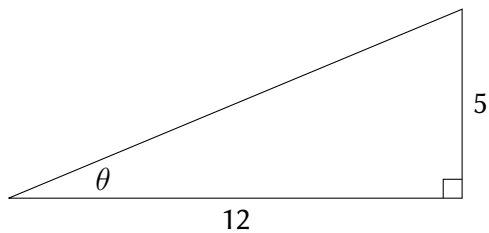
- e). What is the end behavior for $x \rightarrow -\infty$? If it is asymptotic, be sure to indicate whether the asymptote is approached from below or above and why.

- f). What are the y-intercepts (if any)?

- g). Sketch a graph of the function. You must show and label all zeros, asymptotes, and intercepts, with the correct behavior at each. Your sketch need not be to scale.

- 3). Some archaeologists are digging at what appears to be a pre-Columbian human campsite in California. They find some animal bones with human teeth marks on them. Upon carbon-14 analysis, it is found that the bones have 75% of their original C_{14} . About how old are the bones, and hence the campsite? The half-life of C_{14} is 5730 years.

- 4). Consider the following triangle:



Determine all six basic trigonometric ratios.

- 5). You want to measure the height of a tree; however, you can't reach the top to measure it with a tape measurer. So you stand 10 feet from the tree, look up to the top of the tree at an angle of 45° and look down at the bottom of the tree at an angle of $\frac{\pi}{6}$ radians. How tall is the tree (to the nearest tenth of a foot)?