# Math 1140F - Exam 3

Name: _____

Thursday, September 25, 2014
Time: 50 minutes
Instructor: Brittany Cuchta

**Instructions:**

- Do not open the exam until I say you may.
- All cell phones and other electronic noisemaking devices must be turned off or completely silenced (i.e., not on vibrate) for the duration of the exam.
- **No calculators** are allowed on the exam.
- The exam *must* be taken in pencil. Using a pen on the exam will result in the loss of points.
- Failure to follow directions specific to a problem will result in the loss of points.
- Circle or box your final answer where appropriate. Put your final answer in the provided space when available. Failure to do so will result in points being deducted.
- Show **all** work. Full credit will only be given if work is shown which **fully and clearly** justifies your answer. I reserve the right to not grade a problem which I cannot read.
- Answers must be exact (like $\sqrt{2}$), not approximate (like 1.414), unless a problem specifically indicates otherwise.
- All final answers must be simplified unless otherwise specified. **Rationalization is not required unless otherwise specified.**
- If you run out of room, use the back of the page and indicate this on the question.
- As always, you are expected to exhibit academic integrity during the exam.

| Page: | 1 | 2 | 3 | 4 | 5 | Total |
|---|---|---|---|---|---|---|
| Points: | 24 | 22 | 26 | 10 | 18 | 100 |
| Score: | | | | | | |

1. (12 points) Construct a polynomial $f(x)$ with the following characteristics:
   (a) Zeros: -2 (multiplicity 3), 2 (multiplicity 1), 0 (multiplicity 2)
   (b) Degree: 6
   (c) Contains the point: (1, 8)

Polynomial $f(x) =$ _____

2. (6 points) The graph of the polynomial $r(x) = x^2(x-2)(x-3)^3(x-4)^6$

   (a) touches the $x$-axis at $x =$ _____

   (b) crosses the $x$-axis at $x =$_____

3. (6 points) Find a polynomial $g(x)$ of degree 4 with zeros 3 (multiplicity 2) and $i$.

Polynomial $g(x) =$ _____

4. For the polynomial function $H(x) = x^4 - 2x^3 - 4x^2 - 8x - 32$

(a) (4 points) Is $x = 1$ a zero for $H(x)$? Show work and circle your answer.

Circle One: Yes No

(b) (14 points) Use the **Rational Root Theorem** to find all **real** zero(s) of $H(x)$. Using any other method will result in no points being given.

Real Zero(s): _____

(c) (4 points) Find all **complex** zeros of $H(x)$.

Complex Zero(s): _____

5. Given the function $T(x) = \dfrac{x^2 - 64}{x}$

(a) (3 points) State the domain. Give your answer in interval notation.

Domain: _____

(b) (6 points) List the $x$ and $y$ intercepts. If there is none, state so in the provided space.

$x$-intercept(s):_____

$y$-intercept: _____

(c) (6 points) State on which intervals the graph is above the $x$-axis and below the $x$-axis. Use the table method discussed in class.

Above Axis: _____

Below Axis: _____

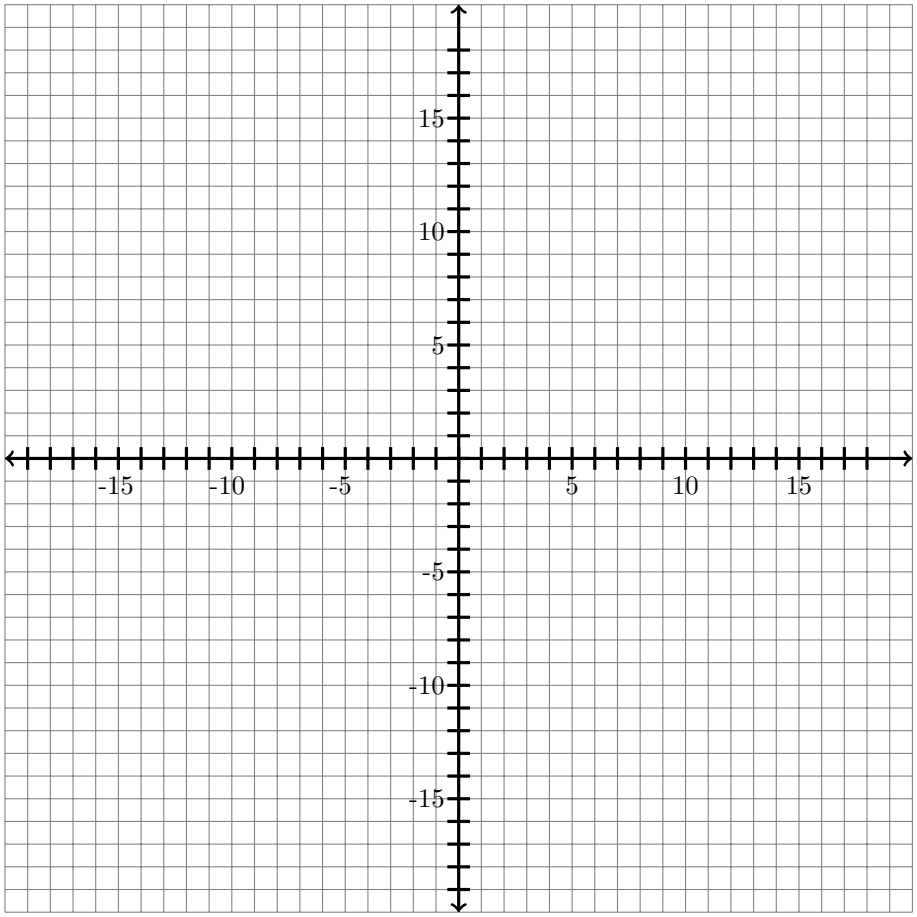
(d) (11 points) Find all vertical, horizontal or oblique asymptotes. If the result doesn't exist, state so in the space provided.

Vertical Asymptote(s): _____

Horizontal Asymptote: _____

Oblique Asymptote: _____

(e) (6 points) Sketch the graph of $T(x)$. Be sure to label any intercepts and asymptotes.




6. (4 points) Solve the inequality $\dfrac{x^2 - 64}{x} \geq 0$. Give your answer in interval notation.

Answer: _____

7. (12 points) Solve the following inequality **algebraically**. Give your answer in interval notation.

$$\frac{4x+5}{x+2} \geq 3$$

Answer: _____

8. (6 points) Use the **Intermediate Value Theorem** to determine whether or not the polynomial $Q(x) = 4x^4 + 15x^2 - 4$ has a zero in the interval $[0, 1]$. Circle your answer. Failure to show work will result in no points being awarded.

Circle One: Yes No