Wilfrid W. Csaplar Jr., Ph.D.Mathematics 103Exam #4 2012/11/30

Write your name on the cover of the test booklet and nowhere else. Failure to follow these directions will cost you 1 point. The test has 100 points (to be scaled up to 140 points) and is scheduled to take 50 minutes. Therefore, expect to spend 1 minute for every 2 points. For example, a 16-point question should take 8 minutes. I cannot allow extra time because of the class that follows our class.

Show all work and write each answer on a separate side of a sheet of paper.

4.1) (10 points) Find the vertical and horizontal asymptote(s) of $F(X) = \frac{X^2 - 7X + 12}{X^2 - 8X + 16}$ if they exist. What is the domain of F(X)? Do not worry about plotting the line.

4.2) (18 points) Find the vertical, horizontal, and slant asymptote(s) of $F(X) = \frac{X^2 + 6X + 5}{X + 2}$ if they exist. Find the X and Y intercept(s) if they exist. Plot the function.

4.3) (18 points) Answer EITHER Part A OR Part B.

A) The equation $\frac{X^2}{4} + \frac{Y^2}{9} = 1$ represents what type of conic section? Find the vertices and foci and plot it.

B) The equation $\frac{X^2}{4} - \frac{Y^2}{9} = 1$ represents what type of conic section? Find the vertices and foci and plot it.

4.4) (4 points) If Question 4.3A was changed to $\frac{(X+3)^2}{4} + \frac{(Y+2)^2}{9} = 1$, then how would the graph move? Explain your logic without actually drawing it.

5.1) (8 points) Draw $F(X) = e^x$ over the domain $X \in [-3, 3]$. Do not worry about exact points except for any intercept(s).

5.2) (12 points) Without using a calculator, find the following values: $\log_5(125)$, $\log(0.001)$, $\ln(e^5)$ and $e^{\ln(9)}$. State how you found each answer.

5.3) (12 points) Simplify TWO of the following.

A) $\ln\left(\frac{X^2 Y}{3Z}\right)$

B) $\log_4(32)$ remember to show work so I know you know how to do it without a calculator.

C) $\log\left(\frac{100X^4}{Y^2}\right)$

5.4) (10 points) Answer EITHER Part A OR Part B.

A) Suppose the population of a town is given by $P = Ae^{0.01t}$. If time t = 0 is 2010, and the population in 2010 was 120, then at what date will the population be 240?

B) Solve $\log_3(X+3) = 27$ for X. Solve $3*\log_2(X) = 8$ for X.

5.5) (8 points) For EITHER the Gaussian model a.k.a. the normal curve ($y = ae^{-(x-b)^2/c}$) OR the logistic growth model, a.k.a. sigmoidal curve ($y = a/(1+be^{-rx})$) draw a generic version.