Wilfrid W. Csaplar Jr., Ph.D.   Mathematics 103   2012/12/15

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 240 points (to be scaled down to 150 points) and is scheduled to take 120 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 no more than <u>two</u> answers on one side of a sheet of paper.
You can use the backside of a page you have already used.

Section P.1) (10 points) Plot (-3, 4]. Find $|-4+2|$

Sections P.2 & P.3) (10 points) Multiply $(X^{1/2} + 4)(2X + 3)$

Sections P.4 & P.5) (20 points) Simplify $\dfrac{4X^3 - 4X^2 - 24X}{X^3 - 4X}$

Section P.6) (8 points) Find EITHER the distance between (2, 6) & (-1, 10) OR the midpoint on the line connecting them.

Section 1.1) (18 points) Find the X-intercept(s) and Y-intercept of $Y = 4X^2 - 16$. Test for ONE of the following symmetries: X-axis, Y-axis, or origin. Make sure you tell me which test you are doing.

Section 1.3) (16 points) Answer EITHER Part A OR Part B.
A) Suppose that your grade in the course was 60%. What grade would you need to earn 63% for the course? There have been 850 points and this exam is worth 150 points.
B) Suppose a rowboat goes eight miles up the river in two hours. Going back down stream, the eight mile trip takes one hour. How fast are the river and boat going?

(20 points) Answer EITHER Part A OR Part B.
A) Section 1.5 and 1.7) Multiply (4+i)(2–i). Plot $5 \le 3-2X < 9$.
B) Section 1.8) Plot $X^2 – 4X > 12$.

Section 2.1) (12 points) Find the equation for a line perpendicular to $Y = 3X – 5$ through the point (3, 1).

Section 2.6) (12 points) If $f(X) = X^2 + 3$, and $g(X) = X – 1$, then find $(f+g)(X)$ and $(f \circ g)(X) = f(g(X))$.

Section 3.1) (14 points) If $f(X) = 2X^2 + 12X + 6$, then get it into standard form and tell me the axis of symmetry and the height of the vertex. Do NOT plot it.

Section 3.3) (14 points) Divide $(X^3 + 3X^2 + 2X + 4)/(X+2)$ using EITHER long division OR synthetic division. What does the remainder tell you?

Section 3.4 (4 points) Answer EITHER Part A OR Part B.
A) What does Descartes' Rule of Signs tell you about the number of positive roots of
$f(X) = 3X^3 - 2X^2 + X - 7$? State how you knew that.
B) If I told you that one of the roots of an equation was $X = 4 -2i$, then what is another root?
State how you knew that.

(22 points) Answer EITHER Part A OR Part B.

A) Section 4.2) Find the vertical, horizontal, and slant asymptote(s) of $F(X) = \dfrac{X^2 + 6X + 5}{X + 2}$

they exist. Find the X and Y intercept(s) if they exist. Plot the function.

B) Section 4.3) The equation $\dfrac{X^2}{4} + \dfrac{Y^2}{9} = 1$ represents what type of conic section? Find the
vertices and foci and plot it.

Section 5.1) (12 points) Draw $F(X) = e^x$ over the domain $X \in$ [-3, 3]. Do not worry about exact
points except for any intercept(s).

Section 5.4) (14 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 $\log_3(X+3) = 2$ for X. Solve $3*\log_2(X) = 9$ for X.

Sections 6.1 & 6.2) (16 points) Solve $Y = X^2 + 4$ and $Y + X = 10$ using the substitution method
or the elimination method.

Section 7.1) (18 points) Write the system of equations $3X + 4Y = 14$ and $X - 2Y = -2$ as an
augmented matrix. Use row operations to get it in row echelon form. Solve for X and Y.