MA 110 — PreCalculus Spring 2016
Exam 2 8 March 2016

Name: _____

Section: _____

Last 4 digits of student ID #: _____

This exam has eleven multiple choice questions (five points each) and five free response questions (nine points each). Additional blank sheets are available if necessary for scratch work. No books or notes may be used. Turn off your cell phones and do not wear ear-plugs during the exam. You may use a calculator, but not one which has symbolic manipulation capabilities.

On the multiple choice problems:

1. You must give your *final answers* in the *multiple choice answer box* on the front page of your exam.
2. Carefully check your answers. No credit will be given for answers other than those indicated on the *multiple choice answer box*.

On the free response problems:

1. Clearly indicate your answer and the reasoning used to arrive at that answer *(unsupported answers may not receive credit)*,
2. Give exact answers, rather than decimal approximations to the answer (unless otherwise stated).

Each free response question is followed by space to write your answer. Please write your solutions neatly in the space below the question. You are not expected to write your solution next to the statement of the question.

Multiple Choice Answers

Question					
1	A	B	C	D	E
2	A	B	C	D	E
3	A	B	C	D	E
4	A	B	C	D	E
5	A	B	C	D	E
6	A	B	C	D	E
7	A	B	C	D	E
8	A	B	C	D	E
9	A	B	C	D	E
10	A	B	C	D	E
11	A	B	C	D	E

Exam Scores

Question	Score	Total
MC		40
12		9
13		9
14		9
15		9
16		9
Percentage		100

Record the correct answer to the following problem on the front page of this exam.

(1) Describe the end behavior of the graph of

$$f(x) = \frac{3x^5 - 2x^3 + 2x - 1}{5x^4 - x + 10}$$

as $x \to \infty$.

A) $y \to \infty$

B) $y \to -\infty$

C) $y \to 0$

D) $y \to -\dfrac{1}{10}$

E) $y \to \dfrac{3}{5}$

(2) If the number of bacteria in a population doubles every 3 hours, how many bacteria will be present in 8 hours if the original number of bacteria is 1000? Round answer to the nearest integer.

A) 5040

B) 25600

C) The number cannot be determined without the growth rate.

D) 10312

E) 6350

(3) Find the domain of $f(x) = \ln(3 - 2x)$.

A) $\left(-\infty, \dfrac{3}{2}\right)$

B) $\left(\dfrac{3}{2}, \infty\right)$

C) $\left[\dfrac{3}{2}, \infty\right)$

D) $\left(0, \dfrac{3}{2}\right)$

E) $(-\infty, \infty)$

Record the correct answer to the following problem on the front page of this exam.

(4) Simplify

$$e^{3\ln(x+2)}.$$

A) $3(x-2)$

B) $(x+2)^3$

C) $3x+6$

D) x^3+8

E) None of the above answers are correct.

(5) Find the inverse $f^{-1}(x)$ for

$$f(x)=\sqrt[5]{2x+1}$$

A) There is no inverse because $f(x)$ is not one to one.

B) $32x^3+1$

C) $\dfrac{1}{\sqrt[5]{2x+1}}$

D) $(2x+1)^5$

E) $\dfrac{x^5-1}{2}$

(6) Simplify the expression

$$\frac{\sqrt{x^3}\sqrt[8]{y^3}}{\sqrt[4]{yx^3}}$$

A) $\frac{x^{\frac{3}{4}}}{y^{\frac{1}{8}}}$.

B) $x^{\frac{-3}{4}}y^{\frac{3}{4}}$.

C) $x^{\frac{3}{4}}y^{\frac{1}{8}}$.

D) 1.

E) The expression can not be simplified.

Record the correct answer to the following problem on the front page of this exam.

(7) Find the remainder when $p(x) = x^{11} + x^5 - 2$ is divided by $x - 1$. Do not do the long division.

A) $x^{10} + x^4 - 1$

B) -4

C) $2x - 1$

D) 0

E) The remainder can not be found with out doing the division.

(8) Find the amount in a bank account after three years if \$2500 is initially deposited at an interest rate of 3.2% compounded monthly. Round your answer to the nearest cent.

A) \$8813.55

B) \$2751.90

C) \$2747.76

D) \$2662.56

E) \$2751.55

(9) Write as logarithm and solve for x exactly.

$$e^{2x+5} = 3$$

A) $e^6 - 5/2$

B) $\log(11)$

C) -2

D) $\dfrac{\ln(3) - 5}{2}$

E) -1.95

Record the correct answer to the following problem on the front page of this exam.

(10) Which statement describes the graph of

$$f(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \ ?$$

A) The graph has a hole at $x = 1$ and a horizontal asymptote of $y = 1$.

B) The graph has a hole at $x = -1$ and no horizontal asymptote.

C) The graph has no horizontal or vertical asymptotes, nor any holes.

D) The graph has a hole at $x = 1$ and a vertical asymptote of $x = -1$.

E) The graph has horizontal asymptotes at $x = -1$ and $x = 1$.

(11) Find the vertex of the parabola

$$f(x) = x^2 + 30x + 500.$$

A) $(-15, 500)$

B) $(30, 500)$

C) $(-15, 275)$

D) $(15, 275)$

E) The parabola does not have a vertex.

Some Useful Formulas

$$B(t) = P\,(1 + r)^t$$

$$B(t) = P\left(1 + \frac{r}{n}\right)^{nt}$$

$$P(t) = P_0 e^{rt}$$

$$Q(t) = Q_0 e^{-rt}$$

(12) Write the expression in terms of a single logarithm.

$$\log(x^2 - 1) + 2\log(x + 3) - \frac{1}{2}\log(x)$$

(13) Solve the inequality exactly. Show all work. Do not use a graphing calculator to get the answer.

$$\frac{x-6}{x+2} \leq \frac{3}{x+2}$$

Free Response Questions: Show your work!

(14) A farmer has 2000 feet of fence to build a pen with dividers as shown. Find the dimensions of the pen that gives the maximum area enclosed.

Free Response Questions: Show your work!

(15) For $p(x) = x^4 - 3x^3 + 5x^2 - x - 1$, use long division to determine

$$\frac{p(x)}{x-1}$$

and write $p(x)$ in the form of $p(x) = Q(x)D(x) + R(x)$

Free Response Questions: Show your work!

(16) Find all the zeros of $p(x) = x^3 - 3x^2 + 2$ given that one of the zeros is $x = 1$. Your answers must be exact. Do not use a graphing calculator to get an approximate answer.