FINAL EXAM

Mathematics 1320/1420, Fall 2014

Group A

Name:

Follow the instructions given to you by your instructor. The test consists of 16 multiple choice problems for which mark your answers on the scantron and 4 problems to be worked out completely in the bluebook. Each multiple choice question is worth 1 point and the open questions are 2 points each. Two out of the four open questions are bonus questions.

1. First, write the value(s) that make the denominator(s) zero. Then solve the equation.

$$\frac{14}{2(x-1)}+\frac{1}{2}=\frac{7}{x-1}$$

a) $x \neq 1; no\ solution$
b) $x \neq -1, 2; \{1, 2\}$
c) $x \neq 1; \{1\}$
d) $x \neq 2; \{1\}$

2. Solve the radical equation.

$$x-\sqrt{3x-2}=4$$

a) $\{9\}$
b) $\{2,9\}$
c) $\{2\}$
d) $\{1,2\}$

3. Find the inverse of the one-to one function.

$$f(x)=\frac{4x-7}{6}$$

a) $f^{-1}(x)=\frac{6}{4x+7}$
b) $f^{-1}(x)=\frac{6}{4x-7}$
c) $f^{-1}(x)=\frac{6x+7}{4}$
d) $f^{-1}(x)=\frac{6x-7}{4}$

4. Solve the inequality and express the solution in interval notation.

$$3 + \left|1 - \frac{x}{2}\right| \geq 5$$

a) $(-\infty, -2] \cup [6, \infty)$
b) $[-2, 6]$
c) $[-6, 2]$
d) $(-\infty, -6] \cup [2, \infty)$

5. Find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$, $h \neq 0$ for the given function.

$$f(x) = x^2 + 2x - 7$$

a) $\frac{2x^2+2x+2xh+h^2+h-14}{h}$
b) 1
c) 2x+h-7
d) 2x+h+2

6. For the given functions $f \ and \ g$, find the indicated composition.

$$f(x) = \frac{x-7}{3}, \ \ g(x) = 3x + 7; \quad (g \circ f)(x)$$

a) x
b) $x + 14$
c) $x - \frac{7}{3}$
d) $3x + 14$

7. Give the vertex, x-intercepts and y-intercept for the function.

$$f(x) = 8 - x^2 + 2x$$

a) Vertex:(-1,9); x-intercepts:(-4,0),(2,0); y-intercept:(0,8)
b) Vertex:(1,9); x-intercepts:(-2,0),(4,0); y-intercept:(0,-8)
c) Vertex:(1,9); x-intercepts:(-2,0),(4,0); y-intercept:(0,8)
d) Vertex:(-1,-9); x-intercepts:(-4,0),(2,0); y-intercept:(0,-8)

8. Use synthetic division to divide $f(x) = x^3 + 6x^2 - 19x - 84$ by $x + 7$. Use the result to find all zeros of the function $f(x)$.

a) {7, -4, 3}
b) {-7, 4, -3}
c) {7, 4, -3}
d) {-7, -4, 3}

9. Evaluate the expression.

$$log_6\sqrt{6}$$

a) 1
b) $\frac{1}{6}$
c) $\frac{1}{2}$
d) 6

10. Solve the equation.

$$2^{(3x+7)} = \frac{1}{4}$$

a) {3}
b) $\left\{\frac{1}{2}\right\}$
c) {1}
d) {-3}

11. Solve the logarithmic equation.

$$log_6(x + 6) + log_6 x = 3$$

a) {18}
b) $\{-18\}$
c) $\{-18, 12\}$
d) {12}

12. Solve the system of equations.

$$\begin{cases} x - y + 5z = -23 \\ 4x + z = -4 \\ x + 2y + z = 2 \end{cases}$$

a) $\{-4, 3, 0\}$
b) $\{-4, 0, 3\}$
c) $\{0, 3, -4\}$
d) $\{3, 0, -4\}$

13. Find values for the variables so that the matrices are equal.

$$\begin{bmatrix} x+3 & y+4 \\ 7 & 9 \end{bmatrix} = \begin{bmatrix} 9 & 7 \\ 7 & z \end{bmatrix}$$

a) $x = -6, y = -3, z = -9$
b) $x = 6, y = 9, z = 9$
c) $x = 6, y = 3, z = 9$
d) $x = 9, y = 7, z = 9$

14. Perform the matrix row operation and write the new matrix.

$$\left[\begin{array}{ccc|c} 5 & -4 & 1 & 4 \\ -5 & 0 & 1 & -2 \\ -1 & 3 & -3 & -1 \end{array}\right] \qquad -4R_1 + R_2 \to R_2$$

a) $\left[\begin{array}{ccc|c} -25 & 16 & -3 & -18 \\ -5 & 0 & 1 & -2 \\ -1 & 3 & -3 & -1 \end{array}\right]$

b) $\left[\begin{array}{ccc|c} 5 & -4 & 1 & 4 \\ 15 & -16 & 5 & 14 \\ -1 & 3 & -3 & -1 \end{array}\right]$

c) $\left[\begin{array}{ccc|c} 25 & -4 & -3 & 12 \\ -5 & 0 & 1 & -2 \\ -1 & 3 & -3 & -1 \end{array}\right]$

d) $\left[\begin{array}{ccc|c} 5 & -4 & 1 & 4 \\ -25 & 16 & -3 & -18 \\ -1 & 3 & -3 & -1 \end{array}\right]$

15. Find the product AB, if possible.

$$A = \begin{bmatrix} -1 & 3 \\ 1 & 2 \end{bmatrix}, \qquad B = \begin{bmatrix} 0 & -2 & 5 \\ 1 & -3 & 2 \end{bmatrix}$$

a) AB in not defined.

b) $\begin{bmatrix} 3 & 2 \\ -7 & -8 \\ 1 & 9 \end{bmatrix}$

c) $\begin{bmatrix} 0 & -6 & 15 \\ 1 & -6 & 4 \end{bmatrix}$

d) $\begin{bmatrix} 3 & -7 & 1 \\ 2 & -8 & 9 \end{bmatrix}$

16. The general term of a sequence is given. Determine whether the given sequence is arithmetic, geometric, or neither. If the sequence is arithmetic, find the common difference; if it is geometric, find the common ratio.

$$a_n = 5n - 2$$

a) $\text{arithmetic}, \text{d} = -2$

b) geometric, $r = 5$

c) arithmetic, $d = 5$

d) neither

17. The sum of the angles of a triangle is $180°$. Find the three angles of the triangle if one angle is twice the smallest angle and the third angle is $20°$ greater than the smallest angle.

18. You have just bought a puppy and want to fence in an area in the backyard for her. You have 100 feet of fence and you decided to make a rectangular fenced-in area using the back of your house as one side. Determine the dimensions of the rectangular pen that will maximize the area in which your puppy may roam. What is the maximum area of that rectangular pen?

19. Use the compound interest formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve. Round to two decimal places.

Suppose that you have $5,000 to invest. Which investment yields the greater return over 4 years: 6.25% compounded continuously or 6.3% compounded semiannually?

20. Graph the piecewise-defined function. $f(x) = \begin{cases} -x + 2 & x < 1 \\ x^2 & x \geq 1 \end{cases}$

a) State the domain and range in interval notation.
b) Determine the intervals where the function is increasing, decreasing, or constant.
c) Find *f*(-1) and *f*(1)