FINAL EXAMINATION - MATH 1320
Spring 2010

Answer the following questions. Show *all* work *and* answers *IN YOUR BLUE BOOK* for full credit. Be neat! Box all answers. You may use a calculator to check your work or to make numerical computations.

1. Solve the quadratic equation using either factoring or the quadratic formula: $7x = -2x^2 - 3$

2. Find the slope-intercept equation for the line passing through $(4, 2)$ that is perpendicular to $x + 2y - 10 = 0$.

3. If $f(x) = 3x^2 + 2$ and $g(x) = 2x^2 + 1$, find $(f \circ g)(x)$.

4. Find the inverse of the function $f(x) = 2x^3 + 3$.

5. The average salary for computer programmers is \$7,740 less than twice the average salary for carpenters. Combined, their average salaries are \$99,000. Determine the average salaries for each of these jobs.

6. Let $f(x) = 3x^2 - 2x - 4$. (Show your work for all of this!)
   (A) What direction is the parabola pointing, and how did you come to this conclusion?
   (B) What is the vertex of the parabola?
   (C) What are the x-intercepts?
   (D) What is the y-intercept?
   (E) Sketch the graph. It does not have to be perfect, but it needs to reflect the information found above.

7. You have 600 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area. What is the largest area that can be enclosed?

8. Find $(-57 - 19x^2 + 20x + 2x^3 + x^4) \div (x + 6)$. Indicate the remainder if there is one. Write your answer in polynomial form.

9. Solve the following logarithmic equation: $\log_3(x + 2) - \log_3(x - 2) = 2$

10. The formula $A = 36.1e^{0.0126t}$ models the population of California, A, in millions, t years after 2005.
    (A) What was the population of California in 2005?
    (B) When will the population of California reach 40 million?

11. Solve the system of equations:
$$\begin{cases} x - y + 3z &= 8 \\ 3x + y - 2z &= -2 \\ 2x + 4y + z &= 0 \end{cases}$$

12. Find the partial fraction decomposition of $\dfrac{5x + 3}{(x - 1)(x + 1)}$

13. Evaluate the following: $\dfrac{15!}{3!12!}$

14. Evaluate the following: $\displaystyle\sum_{i=1}^{5} \frac{i!}{(i-1)!}$

15. You are dealt one card from a 52-card deck. Find the probability that:
    (A) You are dealt a red 7 or a black 8.
    (B) You are NOT dealt a king.

Test 3 Equations

These are in no particular order. You will NOT use all of these equations. You are required to know what they are and how to use these equations.

- Common Form: $f(x) = ax^2 + bx + c$
- Standard Form: $f(x) = a(x-h)^2 + k$ OR $(y-k) = a(x-h)^2$
- $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- $\dfrac{p(x)}{(a_1x + b_1)(a_2x + b_2)\cdots} = \dfrac{A}{a_1x + b_1} + \dfrac{B}{a_2x + b_2} + \cdots$
- $\dfrac{p(x)}{(ax + b)^n} = \dfrac{A}{ax + b} + \dfrac{B}{(ax + b)^2} + \dfrac{C}{(ax + b)^3} + \cdots + \dfrac{N}{(ax + b)^n}$
- $\dfrac{p(x)}{(ax^2 + bx + c)(dx^2 + ex + f)} = \dfrac{Ax + B}{ax^2 + bx + c} + \dfrac{Cx + D}{dx^2 + ex + f}$
- $a_n = a_1 r^{n-1}$
- $\dfrac{n!}{r!(n-r)!}$
- $a_n = a_1 + (n-1)d$
- $\dfrac{n!}{(n-r)!}$
- $S = \dfrac{a_1}{1-r}$