

**QUEENS COLLEGE
DEPARTMENT OF MATHEMATICS**

**Final Examination
2 ½ Hours**

Mathematics 115

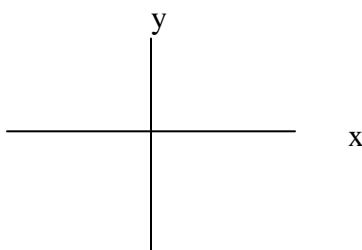
Fall 2008

Directions: Show all work. Only algebraic solutions will be accepted. All answers must be in simplest form, reduced to lowest terms, and with positive exponents.

- 1) Divide: $\frac{x^2+10x-24}{8x^4} \div \frac{4-x^2}{2x^2+4x}$.
- 2) Sketch the graph of $7x-2y=14$. Label the intercepts and give their coordinates.
- 3) Solve for x : $2x(2x-5)-24=0$.
- 4) Write an equation of the line through $(-1, 6)$ and $(4, -9)$.
- 5) Evaluate: $9(5+4)^0 - 16^{\frac{3}{4}} + 3^{-2}$.
- 6) Solve for x : $\frac{5}{x-3} + \frac{4x}{x^2-9} = \frac{2}{x+3}$.
- 7) Simplify: $(\sqrt{x} - \sqrt{3})^2 - (\sqrt{x-3})^2$.
- 8) Write an equation of the line through $(-6, 5)$ and perpendicular to $2y-3x=7$.
- 9) Given $f(x) = \frac{7x}{4x-12}$ and $g(x) = \sqrt{x-6}$. Find the domain of $f(x)$ and the domain of $g(x)$.
- 10) Solve for x and y : $\begin{cases} 7x-9y=-41 \\ 5x+6y=8 \end{cases}$.
- 11) Solve for x : $3x^2 + 4x = 5$.
- 12) Rationalize each denominator and simplify: $\frac{10}{\sqrt{5}} - \frac{12}{\sqrt{5}-1}$.
- 13) Solve for x : $5 + \sqrt{2x-2} = x$.
- 14) Use long division to divide $5x^2 - 12x + 7$ by $x + 4$.
- 15) Simplify: $\frac{1 + \frac{4}{x} - \frac{5}{x^2}}{1 + \frac{5}{x}}$.
- 16) Subtract the sum of $2x^3 - 3x^2 + 12$ and $-3x^3 + 5x - 15$ from $-8x^3 + 12x^2 - 9x - 5$.
- 17) Determine whether each of the following is a function and why/ or why not:

a) $\{(2,5) (3,4) (5,4)\}$

b)

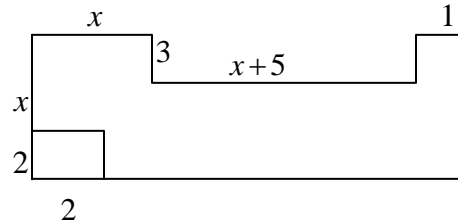


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18) Each month, a counselor in a camp earns a salary of \$825 and \$18 in tips for each child in the group.

- Create a mathematical model to describe how much the counselor earns each month. Represent the variables.
- If the counselor has 22 campers in the group, how much would she earn in a month?
- If the counselor earned \$1,077 one month, how many campers were in the group?

19) Express the shaded area as a function of x :



20) Combine: $\frac{x+5}{x^2+3x-4} + \frac{4}{x^2-16}$.

21) Given $f(x)=5x+6$ and $g(x)=4x^2-2x+1$, find:

- $g(3)-f(1)$
- $f(x-3)$
- $2g(x)+1$

22) Solve for x : $x-b=\frac{cx+4}{a}$.

23) Simplify and write with positive exponents only: $\frac{(4x^8 y^{-3}) (2x^3 y^{-2})^{-5}}{(3x^5 y^2)^0 (16x^8 y^4)^{\frac{1}{4}}}$

24) Simplify: $8y\sqrt{32x^6} - \sqrt[3]{27x^6 y^3} - 4x^2 y \sqrt{18x^2}$.

25) Using the graph of $y=f(x)$ shown to the right, find:

- the domain and range of f
- $f(-3)$
- the value(s) of x for which $f(x)=3$
- the x intercept(s)
- the y intercept.

