Sample Math 002 Final Exam

(with Answers but not Solutions)

SHOW ALL WORK. Simplify all answers. Algebraic solutions are expected unless stated otherwise. Your work must justify your answers. **BOX** your answers. You are encouraged to use your graphing calculator to verify your work.

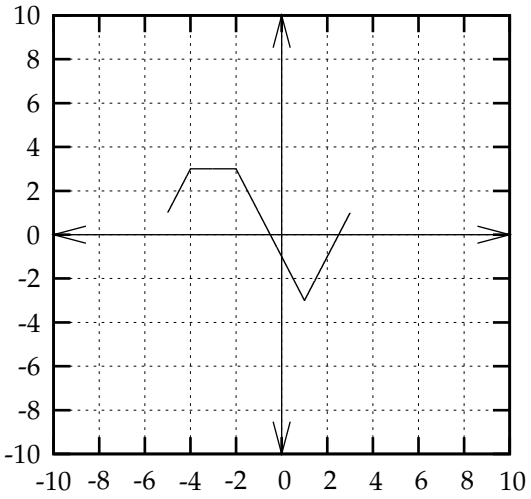
1. a) Evaluate the expression $x^2 + 3x - 2y^2$ if $x = 8$ and $y = 6$.
   b) Simplify $8r - [-2 - 3(-7r + 3)]$ by combining like terms.

2. Simplify. Do not use negative exponents in your final answers.

   a) $\dfrac{-8xy^3}{4x^6y^2}$ b) $\left(8x^3y^5\right)\left(6x^{-6}y\right)$ c) $x^{\frac{-1}{9}}x^{\frac{1}{3}}$ d) $(9a^9)^{\frac{3}{2}}$

3. Given the graph of $f(x)$ below, find each of the following.
   Note: Notice that the scale of the graph goes by 2.

   a) $f(-2)$ b) the domain c) all x values for which $f(x) = 0$ d) estimate the range



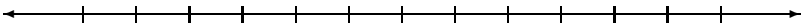
4. Good Buy Appliances allows customers to delay payment on a purchase for one year. It charges 20% simple interest on the purchase price. John bought a computer and agreed to pay $1680.00 one year later. What was the original price of the computer?

5. Find an equation of the line with slope $m = \dfrac{10}{9}$ and containing the point $(18, -10)$. Write your final answer in slope-intercept form.

6. Solve the system $\begin{cases} 4x + y = -15 \\ 8x + 3y = -29 \end{cases}$ using substitution.

7. A total of 647 tickets were sold for a play. The tickets for adults were $7.50 and tickets for children were $2.50. The total receipts for the show were $3632.50. How many of each kind of ticket was sold?

8. Solve $(x-2)+10<3(x-9)$. Graph your solution on the number line and write the solution using interval notation. When appropriate, leave answers in fractional form.



9. Solve each of the following.

   a) $|6x|+20=9$ b)$|x-2|=3$

10. Given the polynomial $7x^5+x^6-2x-1$,

    a) Determine the degree of the polynomial.

    b) Arrange the terms in descending order.

    c) What is the leading coefficient?

    d) Evaluate the polynomial at $x=-1$.

11. Multiply: a) $(5x+4y)^2$ b)$(x-2)(x^2+2x+4)$

12. Factor: a)$16x^2-1$ b) $3x^2-4x-7$

13. Solve algebraically: a) $2x^2=6x$ b) $x^2-12x+37=0$

14. Solve for the indicated variable: a) $L=\dfrac{mx}{n}$ for x b) $-10L-7W=Q$ for W.

15. Algebraically find the zeros of the function $f(x)=2x^2+17x+30$. Check with your grapher.

16. Suppose that a flare is launched upward with an initial velocity of 64 ft/sec from a height of 320 feet. Its height in feet, $h(t)$, at t seconds is given by $h(t)=-16t^2+64t+320$.

    a) How high is the flare at 2 seconds?

    b) Use your grapher to determine when the flare will reach the ground. Round your answer to the nearest tenth.

17. Multiply, simplify if possible: $\dfrac{c^2+10c+25}{4c^2}\cdot\dfrac{c^2+8c}{2c+10}$

18. Perform the indicated operation. Simplify when possible: $\dfrac{11x+11}{x^2-49}-\dfrac{10x+4}{x^2-49}$

19. Solve $\dfrac{t}{t+1}-\dfrac{5}{t+11}=\dfrac{2t-8}{t^2+12t+11}$ for t. Check that your answers are valid solutions.

20. A pool can be filled in 10 hours if water enters through a pipe alone, or in 26 hours if water enters through a hose alone. If water is entering through both the pipe and the hose, how long will it take to fill the pool? Round your final answer to the nearest thousandth.

21. Follow directions below. Leave answers in $a+bi$ form.

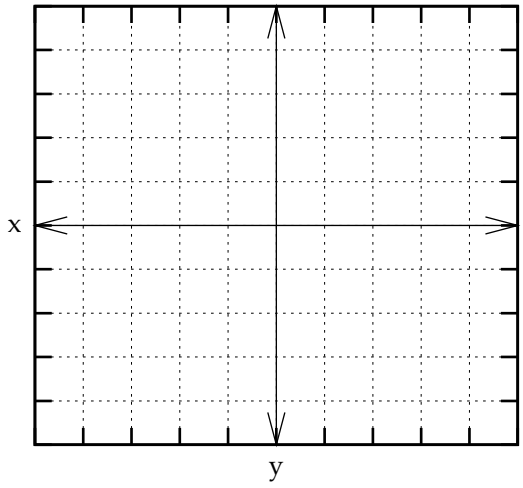
    a) Multiply: $(2-2i)(-1+2i)$ b) $\mathtt{Subtract}: (1+2i)-(-2+8i)$

22. Rationalize each denominator: a) $\dfrac{5}{\sqrt{6}}$ b)$\dfrac{4}{6+\sqrt{3}}$

23. Solve $\sqrt{10x+84}=x+6$ for x. Identify any extraneous solutions.

24. A TV set with a 18 inch diagonal has a screen with a height of 13 inches. To the nearest thousandth, what is its width?

25. Clearly define an appropriate scale and make an accurate sketch of the graph of the function defined by $f(x) = 2(x+1)^2 - 3$. Label the vertex of the graph and at least one additional point on the graph clearly.



26. Let $f(x) = 2x^2 - 20x + 56$.
    a) Find $f(0)$.
    b) Find $f(r)$.
    c) Find the vertex of the graph $y = f(x)$.
    d) Is the vertex a maximum or a minimum point of the graph of the function $y = f(x)$?

Answers but not Solutions

1. a) 16
   b) $-13r + 11$
2. a) $\frac{-2y}{x^5}$ b) $\frac{48y^6}{x^3}$ c) $x^{\frac{2}{9}}$ d) $27a^{\frac{27}{2}}$
3. a) 3 b) $-5 \leq x \leq 3$ c) $-0.5, 2.5$ d) $-3 \leq y \leq 3$
4. \$1400.00
5. $y = \frac{10}{9}x - 30$
6. $x = -4$ and $y = 1$ (Credit given only if the substitution method was used.)
7. 403 Adult tickets 244 Child tickets
8. $(\frac{35}{2}, \infty)$
9. a) No solution b) $x = -1, 5$
10. a) 6 b) $x^6 + 7x^5 - 2x - 1$ c) 1 d) -5
11. a) $25x^2 + 40xy + 16y^2$ b) $x^3 - 8$
12. a) $(4x+1)(4x-1)$ b) $(x+1)(3x-7)$

13. a) $x = 0, 3$ b) $x = 6 \pm i$

14. a) $x = \frac{nL}{m}$ b) $W = \frac{-10L - Q}{7}$

15. $x = -6$, $x = \frac{-5}{2}$

16. a) 384 feet b) 6.9 seconds

17. $\frac{(c+5)(c+8)}{8c}$

18. $\frac{1}{x-7}$

19. $t = -3$ (solution)
$t = -1$ (extraneous or invalid solution)

20. 7.222 hours

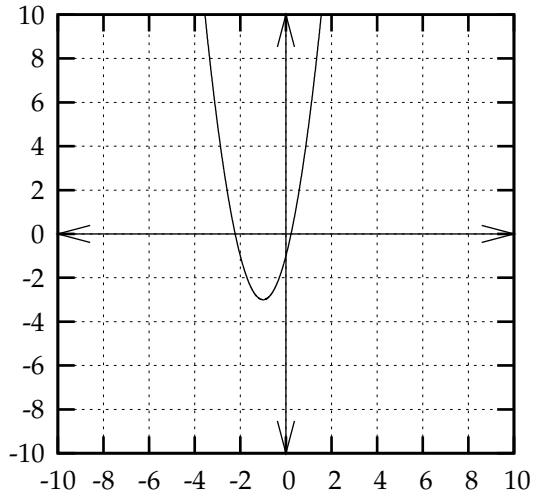
21. a) $2 + 6i$ b) $3 - 6i$

22. a) $\frac{5\sqrt{6}}{6}$ b) $\frac{24 - 4\sqrt{3}}{33}$

23. $x = 6$ $x = -8$ is an extraneous solution.

24. 12.450 inches

25. a) Vertex: $(-1, -3)$



26. a) 56 b) $2r^2 - 20r + 56$ c) $(5, 6)$ d) minimum