Math 80
Final Exam Answers

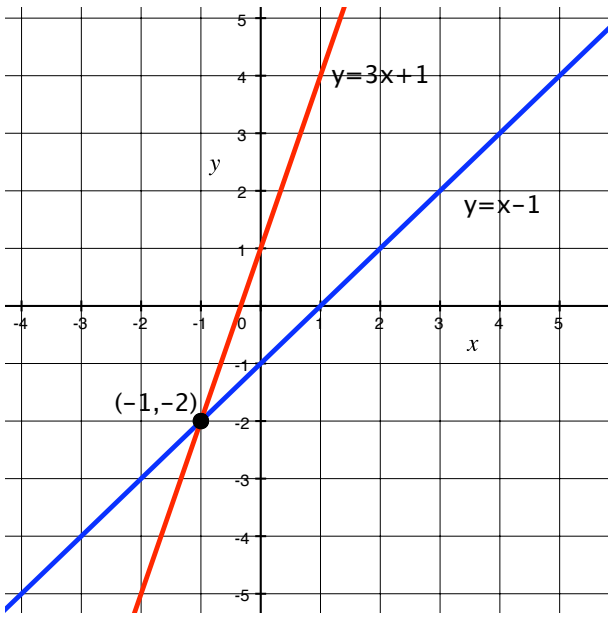
1. (a) $\frac{5}{3}$
   (b) $-\frac{2}{5}$
   (c) $6\sqrt{2}$
   (d) $1.7x^3 + 5x - 5.1$
   (e) $6m^2 + 19m - 7$
   (f) $22x^3y + 11xy^2 + 55xy$

2. (a) $x = 15$ (Clearing fractions first makes this easier to solve.)
   (b) $t = 2$

3. (a) $a = \frac{1}{2}$, $b = -1$

   (b) $x = 2$, $y = 3$

4. The solution to the system will be the point(s) where the lines intersect. (If any.)



$y = x - 1$ → Slope $= 1$, y-intercept: (0,−1)

$-6x + 2y = 2$ ⇒ $y = 3x + 1$
→ Slope $= 3$, y-intercept: (0,1)

Guess: $(-1, -2)$

You can check by evaluating each equation with $x = -1$ and $y = -2$. ⇒ Solution: $(-1, -2)$

5. Slope of Line $= \frac{1}{4}$, Equation in slope-intercept: $y = \frac{1}{4}x - \frac{5}{4}$ (Put in point-slope form first.)

6. (a) $-x(x + 8)(x - 3)$

   (b) $(3y - 2)(y - 4)$

(c) $(5a+b)(5a-b)$

7. (a) The submarine is 500 feet deep.

   (b) The submarine travels at a depth of 1000 feet for 3 hours.

8. (a) $x = \pm 4$

   (b) $x^2 - 8x = 2 \quad \Rightarrow \quad (x-4)^2 = 18 \quad \Rightarrow \quad x = 4 \pm 3\sqrt{2}$

   (c) $x = \frac{-(-3)\pm\sqrt{(-3)^2-4(2)(-1)}}{2(2)} \quad \Rightarrow \quad x = \frac{3\pm\sqrt{17}}{4}$

   Decimal approximations: $x = \frac{3+\sqrt{17}}{4} \approx 1.78 \qquad x = \frac{3-\sqrt{17}}{4} \approx -0.28$

9. You can solve this using just one variable or with two variables.

   - <u>One variable</u>:
     Unknowns: Time spent walking $= x$, Time spent jogging $= 6 - x$

     Equation: $3x + 5(6-x) = 22 \quad \Rightarrow \quad x = 4$

     Solution: You walked for 4 hours and jogged for 2 hours.

   - <u>Two variables</u>:
     Unknowns: Time spent walking $= x$, Time spent jogging $= y$

     Equations: $x + y = 6, \qquad 3x + 5y = 22 \quad \Rightarrow \quad x = 4, \;\; y = 2$
     (Using substitution or elimination)

     Solution: You walked for 4 hours and jogged for 2 hours.

10. The length of leg 1 is $x - 2$ and the length of leg 2 is $x - 4$.

    So, using the Pythagorean theorem, we have that

    $$(x-2)^2 + (x-4)^2 = x^2 \qquad \Rightarrow \qquad x^2 - 12x + 20 = 0$$
    $$\Rightarrow \quad x = 10 \quad \text{or} \quad x = 2$$

    If $x = 10$, then the lengths of the sides are 10, 8, and 6. If $x = 2$, then the lengths of the sides are 2, 0, and -2, which is nonsense! So, we must have that $x = 10$.

    Solution: The lengths of the sides are 10, 8, and 6.