Math 70
Final Exam Solutions

1. (a) $\frac{3}{4} \cdot \frac{5}{6} = \frac{15}{24} = \boxed{\frac{5}{8}}$

   (b) $\frac{5}{6} + 1\frac{3}{8} = \frac{5}{6} + \frac{11}{8} = \frac{20}{24} + \frac{33}{24} = \boxed{\frac{53}{24} \quad \text{or} \quad 2\frac{5}{24}}$

   (c) $\dfrac{\frac{3}{4}}{\frac{8}{9}} = \frac{3}{4} \cdot \frac{9}{8} = \boxed{\frac{27}{32}}$

   (d) $-4.4 - 1.38 = \boxed{-5.78}$

   (e) (4 pts.) $5 - 2(7-4)^2 = 5 - 2(3)^2 = 5 - 2(9) = 5 - 18 = \boxed{-13}$

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2. $8.8 \text{ km} \times \dfrac{0.6 \text{ miles}}{1 \text{ km}} = \boxed{5.28 \text{ miles}}$

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3. (a) $-7 + 10 = 5x + 18 \quad \Rightarrow \quad 3 = 5x + 18 \quad \Rightarrow \quad -15 = 5x$ (Subtr. 18 from both sides)

   $\Rightarrow \quad \boxed{-3 = x}$

   (b) Two Ways to do this:

   - $5x + \frac{1}{2} = 2x + 1 \quad \Rightarrow \quad 5x = 2x + \frac{1}{2}$ (Subtr. $\frac{1}{2}$ from both sides)

     $\Rightarrow \quad 3x = \frac{1}{2}$ (Subtr. $2x$ from both sides)

     $\Rightarrow \quad \boxed{x = \frac{1}{6}}$ (Div. both sides by 3)

   - Multiply both sides by 2 to clear the fractions: $10x + 1 = 4x + 2$

     After subtracting 1 and $4x$ from both sides, we have $6x = 1 \quad \Rightarrow \quad \boxed{x = \frac{1}{6}}$

   (c) $2(y + 3.5) + y = 1 \quad \Rightarrow \quad 2y + 7 + y = 1$ (Distributing the 2)

   $\Rightarrow \quad 3y + 7 = 1$ (Combining like terms)

   $\Rightarrow \quad 3x = -6$

   $\Rightarrow \quad \boxed{x = -2}$

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4. Tax = 8% of \$23,000 = 0.08(23000) = 1840.00 So, the total cost is \$23,000+ \$1,840 = \boxed{\$24,840.}

5. Since Bob answered 10 out of 80 incorrectly, to find the percentage, we need to get the decimal form of $\frac{10}{80}$. Since $\frac{10}{80} = \frac{1}{8} = 0.125$ (dividing 1 by 8), Bob answered $\boxed{12.5\%}$ of the questions incorrectly.

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6. (a) $2^{-3} = \frac{1}{2^3} = \boxed{\frac{1}{8}}$

   (b) $(\frac{1}{5}x^3)^2 = (\frac{1}{5}x^3)(\frac{1}{5}x^3) = \boxed{\frac{1}{25}x^6}$

   (c) $\frac{3x^2y}{12x^2y^6} = \frac{1}{4}y^{-5} = \boxed{\frac{1}{4y^5}}$ (Note that $\frac{x^2}{x^2} = 1$)

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7. Since $d = rt$ or $t = \frac{d}{r}$, the time spent on the ride $= \frac{21.6}{9} = \boxed{2.4 \text{ hours.}}$

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8. (a) **Unknowns:** Width $= w$, Length $= 3x + 4$

   Equation: $w + w + 3x+4 + 3w+4 = 48$ (Perimeter is the sum of all the sidelengths)

   $\Rightarrow \quad 8w+8 = 48 \quad \Rightarrow \quad w = 5$ (Subtr. 8 from both sides and then div. by 8)

   Solution: $\boxed{\text{The width is 5 feet and the length is 19 feet.}}$

   (b) **Unknowns:** Ann's rent $= A$, Betty's rent $= A + 150$

   Equation: $A + A + 150 = 1100$

   $\Rightarrow \quad 2A+150 = 1100 \quad \Rightarrow \quad A = 475$ (Subtr. 150 from both sides and then div. by 2)

   Solution: $\boxed{\text{Ann will pay \$475 and Betty will pay \$625.}}$

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9. (a) $(7x^2 - 2x) - (-x^2 + 5x - 8) = 7x^2 - 2x + x^2 - 5x + 8$ (Distributing -1)
   $= \boxed{8x^2 - 7x + 8}$

   (b) $(x - 3)(4x + 2) = 4x^2 + 2x - 12x - 6 = \boxed{4x^2 - 10x - 6}$

   (c) $2x(x^2 + 3x - 8) + x^2 = 2x^3 + 6x^2 - 16x + x^2 = \boxed{2x^3 + 7x^2 - 16x}$

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10. (5 pts.) Solve $12x + 3y = 9$ for the variable y.

Subtracting $12x$ from both sides: $3y = 9 - 12x$

Dividing both sides by 3: $\boxed{y = 3 - 4x}$

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11. (a) $4.498 \times 10^9 = \boxed{4{,}498{,}000{,}000 \text{ km}}$ (Move decimal right by 9 places)

(b) $0.0000682 = \boxed{6.82 \times 10^{-5}}$

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12. (a) i. Plugging in $y = 4$ and solving for x: $x + \frac{1}{2}(4) = 1 \quad \Rightarrow \quad \boxed{x = -1}$

ii. Plugging in $x = 0$ and solving for y: $0 + \frac{1}{2}y = 1 \quad \Rightarrow \quad \boxed{y = 2}$
(Multiply both sides by 2 to solve for y OR divide both sides by $\frac{1}{2}$)

iii. Plugging in $x = 2$ and solving for y: $2 + \frac{1}{2}y = 1 \quad \Rightarrow \quad \frac{1}{2}y = -1 \quad \Rightarrow \quad \boxed{y = -2}$

(b) You can use any three ordered pairs/points that satisfy $2x + \frac{1}{2}y = 1$, so I will use the ones from part (a).
(Note: I need to make a graph for this at home, so this solution set is incomplete! It will be complete by Saturday morning 12/11.)