Exam 1b Algebra & Trig 2/28/2003

Each problem is worth 10 points. For full credit provide complete justification for your answers.

1. Simplify 5 - 2[7y - 3y(y - 2)].

$5-2[7y-3y(y-2)]$

$5-2[7y-3y^2+6y]$

$5-2[13y-3y^2]$

$5-26y+6y^2$

Great!

2. Solve 9 - 5x = 3x + 7.

$2=8x$

$\frac{1}{4}=x$

Good

$9-5\frac{1}{4}=3\frac{1}{4}+7$

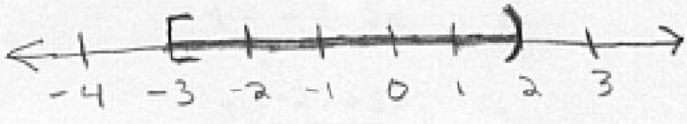
$7.75=7.75$

Great idea!

3. Rewrite $-3 \le x < 2$ both in interval notation and on a number line.

$[-3, 2)$

Yes



4. Simplify $(16x^4y^{-12})^{1/4}$ and write the answer using positive exponents only.

$= \frac{2x}{y^3}$ Great

5. Solve $2x - 3y = 16$
$5x - y = 27$

$5x - y = 27$
$+y \quad +y$
$5x = y + 27$
$-27 \quad -27$
$5x - 27 = y$

$2x - 3(5x - 27) = 16$
$2x - 15x + 81 = 16$
$-81 \quad -81$
$-13x = -65$
$\frac{-13}{-13} \quad \frac{-65}{-13}$
$x = 5$

$5(5) - y = 27$
$25 - y = 27$
$-25 \quad -25$
$\frac{-y}{-1} = \frac{2}{-1}$
$y = -2$

Well done!

✓ $2(5) - 3(-2) = 16$
$10 + 6 = 16$
Yes!
✓ $5(5) + +2 = 27$
$25 + 2 = 27$

6. Write $\frac{5-4i}{3+2i}$ in standard form.

$\frac{5-4i}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{15-12i-10i-8}{9+4} = \frac{7-22i}{13}$

$\frac{7}{13} - \frac{22}{13}i$

Good

7. Solve $|3x - 6| > 5$ and express the solution both with interval notation and on a number line.

$|3x-6|>5$

$3x-6>5$

$3x>11$

$x>\frac{11}{3}$

$-(3x-6)>5$

$-3x+6>5$

$-3x>-1$

$x<\frac{1}{3}$

$(-\infty, \frac{1}{3}) \cup (\frac{11}{3}, \infty)$

Excellent

8. Solve $\sqrt{x-1} + 2x = 3$. $-2x$ $-2x$

$(\sqrt{x-1})^2 = (3-2x)^2$ $(3-2x)(3-2x)$ $9-6x-6x+4x^2$

$x-1 = 4x^2-12x+9$

$-x+1$ $-x+1$

$4x^2-13x+10=0$

$\frac{13 \pm \sqrt{169-9(4)(10)}}{8} = \frac{13 \pm \sqrt{9}}{8} = \frac{13 \pm 3}{8} =$ (160)

~~$x=2$~~ or $\boxed{x=1\frac{1}{4}}$

Great job

10. For what values of a and b is the inequality $a + b \le b - 2a$ true?

$-b \quad -b$

$a \le -2a$

$3a \le 0$

$a \le 0$

So a has to be less than or equal to zero, but it doesn't matter what value b has.

9. Buzz is a precalc student at the University of Iowa who's having some trouble. He says "Whoa, man, this math class is kicking my butt. There was this question on our test that was, like, $x^3 + x^2 - 5x + 3$, and we were supposed to tell if it factored like $(x-1)(x-1)(x+3)$ or not. But, like, I never saw in High School how you do ones where there's x^3 in it, so I had no chance at all!"

Explain to Buzz, clearly enough that he can understand, how he could have answered the question even without knowing how to factor a third degree equation.

To determine if the equation factored like $(x-1)(x-1)(x+3)$, you could work backwards. By this I mean multiply $(x-1)(x-1)(x+3)$ to determine if it in fact equals x^3+x^2-5x+3. This will tell you if that equation factors like that without even factoring the equation!

$(x-1)(x-1) = x^2 - 2x + 1$

$(x+3)(x^2-2x+1) = x^3 - 2x^2 + x + 3x^2 - 6x + 3$

$\boxed{x^3 + x^2 - 5x + 3}$

Yes the equation does factor to $(x-1)(x-1)(x+3)$

Excellent