Math 152 S09N01 - Quiz 2 Name: SOLUTIONS.
Jan 21 2009 Stu#:

(1) [5 points] Solve $2^{2x-1} = 4$.

$$2^{2x-1} = 4$$

$$2^{2x-1} = 2^2$$

$$\therefore \quad 2x - 1 = 2$$

$$2x = 3$$

$$\boxed{x = \frac{3}{2}}$$

(2) [5 points] Solve $\log_3 (x^2 + 1) = 2$.

$$\log_3 (x^2+1) = 2$$

$$\therefore \quad 3^2 = x^2+1$$

$$\left.\begin{aligned} x^2 &= 8 \\ x &= \sqrt{8}, \ -\sqrt{8} \end{aligned}\right\} \therefore \text{ solutions are } x = \sqrt{8}, -\sqrt{8}$$

<u>Check:</u>

<u>$x=\sqrt{8}$</u> :

$$\begin{array}{l|l} \log_3 (x^2+1) & 2 \\ \log_3 ((\sqrt{8})^2+1) & 2 \\ \log_3 (9) & 2 \\ 2 & = 2 \ \checkmark \end{array}$$

<u>$x = -\sqrt{8}$</u> :

$$\begin{array}{l|l} \log_3 (x^2+1) & 2 \\ \log_3 ((-\sqrt{8})^2+1) & 2 \\ \log_3 (9) & 2 \\ 2 & = 2 \ \checkmark \end{array}$$

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(3) [**5 points**] Write as a single simplified logarithm:

$$8\log_2\sqrt{3x-2}-\log_2\left(\frac{4}{x}\right)+\log_2 4$$

$$= 8\log_2(3x-2)^{\frac{1}{2}}-\log_2\left(\frac{4}{x}\right)+\log_2 4$$

$$= \log_2(3x-2)^{\frac{8}{2}}-\log_2\left(\frac{4}{x}\right)+\log_2 4$$

$$= \log_2\left[\frac{(3x-2)^4}{\left(\frac{4}{x}\right)}\right]+\log_2 4$$

$$= \log_2\left[\frac{(3x-2)^4(4)}{\left(\frac{4}{x}\right)}\right]$$

$$= \log_2\left[\cancel{4}(3x-2)^4\cdot\frac{x}{\cancel{4}}\right]$$

$$= \log_2\left[x(3x-2)^4\right]$$