21-111 Calculus I - Fall 2004

Diagnostic Test

August 30, 2004

Name:

Recitation Group:

There are 10 problems on this exam. Complete all problems, showing all work.

This Diagnostic Test does not count towards your final grade.

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1. Simplify

\[x(y + z) - z(x + y) + 2y(x - z) - 3(3y - 2z)\]

2. Simplify

(a) \(\frac{2 + x^2}{2}\)

(b) \(\frac{xy}{x^2 - y^2}\)
3. Express as simply as you can

(a) \( \frac{2}{5} - \frac{1}{2} + \frac{1}{3} \)

(b) \( \frac{\frac{1}{x} - \frac{x}{y}}{\frac{1}{x} + \frac{x}{y}} + \frac{x-y}{xyz} \)
4. Simplify

(a) \( \frac{1}{2^{1/3}} - \frac{1}{2} + \frac{1}{5^{1/2}} \)

(b) \( x^2y^{-2}z^3x^{-2}y^3z^5 \)

(c) \( (x^{-1} + y^{-1})^{-1} \)
5. Simplify, if possible, assuming $a > 0$ and $b > 0$

(a) $\sqrt{a^2b^2}$

(b) $\sqrt{a^2 + b^2}$

(c) $\left(\frac{9a^8}{16b^4}\right)^{-\frac{1}{2}}$
6. Simplify, if possible,

(a) \((-\infty, 5) \cap [3, \infty)\)

(b) \((-\infty, 5) \cup [3, \infty)\)

(c) \([3, 5] \cap (10, \infty)\)
7. Complete the square of $x^2 - 6x + 15$.

8. Solve for $x$: $2y^2x - y^2 + (1 + 3y) = x$
9. Find all real solutions of $\sqrt{x} - 4 = 0$

10. Find all real solutions of $x^{\frac{2}{5}} - 3x^{\frac{1}{5}} + 2 = 0$
Extra space if needed