Practice Problems for the Early Exam

MAT 131

Sept 10, 2011

Name: (please print)	**ID #**:

No notes, books or calculators.

The actual test will contain fewer problems than given in this exam; however, the difficulty of each problem will be similar to the ones here.

1. Simplify the following expressions:

- $\left(\dfrac{2x^2y^{1/2}}{x^3y^{-1}}\right)^3$
- $\dfrac{a-b}{\sqrt{a}-\sqrt{b}}$
- $\dfrac{x^2+3x+2}{x+2}$

2. Sketch the graphs of the following functions, marking x and y intercepts

- $f(x) = x^3 + 1$
- $y = \sin(2x) - 1$
- $y = 3 \cdot 2^{-x}$

3. Write the function $u(x) = e^{x-2}$ as a composition: $u = f \circ g$

4. Find $\tan(22\pi/3)$ (please give an exact answer, not an approximation).

5. The half-life of bismuth-10 is 5 days. If initially we have a 100 g sample of bismuth-210, answer the following questions

(a) Find the amount remaining after 15 days

(b) Find the amount remaining after t days

(c) How many days will it take for the amount of bismuth to reach 1 gram? (You can write the answer as a formula, using exponents, logarithms and any other functions you know.)

6. For each of the following functions, find its domain, range and determine whether it is one-to-one or not. If it is, compute the inverse function and find its domain and range.

- $f(x) = \sqrt{3 - e^x}$
- $g(x) = x^2 - 2x$

7. Write $\ln(3^5 4^{-3})$ in terms of $a = \ln(3)$, $b = \ln(2)$.

8. Solve for x

$$\ln(x^2 - 1) = 0$$