MATH. 2443, AN EXTRA CREDIT TEST

TOMASZ PRZEBINDA

1. Express the decimal 12.34 as a fraction $\frac{a}{b}$.

$12.34 = \frac{1234}{100} = \frac{617}{50}$.

2. Express the difference $\frac{x^2}{x^3-1} - \frac{1}{x^3-1}$ as a fraction $\frac{f(x)}{g(x)}$ **with no cancellations**.

$$\frac{x^2}{x^3-1} - \frac{1}{x^3-1} = \frac{x^2-1}{x^3-1} = \frac{(x-1)(x+1)}{(x-1)(x^2+x+1)} = \frac{x+1}{x^2+x+1}\,.$$

3. Find **all** real numbers x such that $\cos(x) = 0$.

$x = k\pi \qquad (k \in \mathbb{Z})$.

4. Give an example of a continuous function $f : \mathbb{R} \to \mathbb{R}$ and a point $x \in \mathbb{R}$ such that the derivative $f'(x)$ does NOT exist.

$f(x) = |x|$, at $x = 0$.

5. State the Fundamental Theorem of Calculus.

Here is one of several equivalent versions of that theorem.

Suppose f is a continuous, real valued function, defined on the interval $[a, b]$. Then for any $x \in (a, b)$

$$\frac{d}{dx}\int_a^x f(t)\,dt = f(x).$$

6. Which of the following statements is true:

$$(1) \qquad \int_{-\pi}^{\pi} \cos x\,dx = \sin(x) + C\,,$$

$$(2) \qquad \int_{-\pi}^{\pi} \cos x\,dx = 0\,.$$

Only statement (2) is true.