Math 16B, Section 1 - Spring 2017
Instructor: Christopher O'Neill
Practice Exam 3

Last Name: _____ **First Name:** _____

Directions:
- The use of a calculator, cell phone, laptop or computer is prohibited.
- TURN OFF cell phones and put them away. If a cell phone is seen during the exam, your exam will be collected and you will receive a zero.
- Answer all of the questions, and present your solutions in the space provided. *Show all your work* neatly and concisely and *clearly indicate your final answer*. You will be graded not merely on the final answer, but on the quality and correctness of the work leading up to it.

The UC Davis Code of Academic Conduct

I will conduct myself with honesty, fairness, and integrity.

Signature: _____

(1) Find the total area of the bounded region between the following curves.

$$f(x) = x^3 - x^2 + 1 \qquad \text{and} \qquad g(x) = x^3 - 2x^2 + x + 3$$

(2) Evaluate each of the following integrals.

(a) $\displaystyle\int \frac{1}{\cos^2(x)\cot(x)\sec(x)}\, dx$

(b) $\displaystyle\int \frac{1}{x\ln(x^2)}\,dx$

(c) $\displaystyle\int x\ln(2x+1)\,dx$

(d) $\displaystyle\int e^{3x}\sqrt{5+e^{3x}}\,dx$

(e) $\displaystyle\int \frac{2 - \cos(x) + \sin(x)}{\cos^2(x)}\, dx$

(f) $\displaystyle\int \tan^3(x)\, dx$

(g) $\displaystyle\int \frac{4x + 2}{x^2 + x}\, dx$

(3) Evaluate each of the following integrals.

(a) $\int_0^{\pi/4} \sec^2(x) \tan(x) \ dx$

(b) $\int_0^\infty \frac{1}{(3x+2)^4} \ dx$

(c) $\int_{-\infty}^\infty \frac{x^3}{x^4+1} \ dx$

(4) Evaluate the following integral.

$$\int \frac{x^3 + 1}{x^3 + 3x^2} \, dx$$

Trigonometric Identities

$$\sin(A+B) = \sin(A)\cos(B) + \cos(A)\sin(B)$$

$$\sin(A-B) = \sin(A)\cos(B) - \cos(A)\sin(B)$$

$$\cos(A+B) = \cos(A)\cos(B) - \sin(A)\sin(B)$$

$$\cos(A-B) = \cos(A)\cos(B) + \sin(A)\sin(B)$$

$$\sin(2A) = 2\sin(A)\cos(A)$$

$$\cos(2A) = \cos^2(A) - \sin^2(A)$$

$$\sin^2(A) + \cos^2(A) = 1$$

$$\tan^2(A) + 1 = \sec^2(x)$$

$$1 + \cot^2(A) = \csc^2(x)$$

$$\int \sec(x)\ dx = \ln|\sec(x) + \tan(x)| + C$$

$$\int \csc(x)\ dx = -\ln|\csc(x) + \cot(x)| + C$$

Error Estimates

$$|E_T| \leq \frac{M(b-a)^3}{12n^2} \qquad f''(x) \leq M \text{ for all } x \in [a,b]$$