MAC 2233, Spring 2018

# Exam #4

April 17, 2017

**Name** _____

- You will be told when to begin the work and when to terminate work on the examination. You must stop when instructed. Points may be deducted in case of violations.
- Please show your work to support your answers that require calculations. Correct but unsupported answers may not be given full credit.
- The use of a cell phone or other electronic communication devices during the examination is not allowed. The exam will be canceled and a grade of "0" will be assigned to anyone who opens a cell phone during the examination or if one is found on their seat or hand.

**No calculators are allowed!**

1. (8 pts each) Verify that $F(x)$ is an antiderivative of $f(x)$.

   (a) $F(x) = 2 - x + x^4; f(x) = 4x^3 - 1$

   (b) $F(x) = \ln(-x) + 7; f(x) = \frac{1}{x}$

   (c) $F(x) = \ln(\ln(x)); f(x) = \frac{1}{x\ln(x)}$

2. (8 points each) Find the indefinite integral.

   (a) $\int 5 - 6x^2 \, \mathrm{d}x$

   (b) $\int \frac{3-2x^2}{x} \, \mathrm{d}x$

3. (10 points each) Find the indefinite integral [Hint: use substitution]

(a) $\int \sqrt{2-t}\ \mathrm{d}t$

(b) $\int \frac{t^3}{\sqrt{t^4-2}}\ \mathrm{d}t$

(c) $\int \frac{2\ln(x)}{x}\ \mathrm{d}x$

4. (10 points each) Evaluate the integral and simplify your answer.

   (a) $\int_1^3 2x - 3 \, \mathrm{d}x$

   (b) $\int_{\frac{1}{2}}^{1} \frac{e^{\frac{1}{x}}}{x^2} \, \mathrm{d}x$

5. (10 pts) A manufacturer estimates that the marginal cost of producing q units of a certain commodity is $C'(q) = 3q^2 - 12q + 12$ dollars per unit. If the cost of producing 1 unit is \$20, what is the cost of producing 5 units? [You can leave your answer in calculator ready form. No simplification is necessary.]

6. (3 extra credit points) Find the **exact** value of the following integral. Simplify your answer.

$$\int_e^{e^e} \frac{1}{x \ln x} \, \mathrm{d}x$$

7. (3 extra credit points) Evaluate

$$\int \frac{x-4}{x+1} \, \mathrm{d}x$$

8. (4 extra credit points) Erika and Jacob are arguing. Erika says that an antiderivative of $\frac{1}{x}$ is $\ln x$ and Jacob says that an antiderivative of $\frac{1}{x}$ is $\ln(2x)$. Can you decide who, if anyone, is right and who is wrong? **Explain** your answer.