



Name: _____

Mark:
25

MATH 101

Assignment 4

1. (2 marks) Use formulas from the Integration Tables to assist you in finding the indefinite integral

$$\int (\ln x)^3 dx.$$

See Appendix B in the textbook for the complete list of 100 integration formulas. Identify, by number, which formula(s) you use and simplify your answer.

Note: On this assignment and subsequent assignments and tests, you may only use formulas from the Integration Tables if a question, like this one, explicitly instructs you to do so. You would otherwise be expected to show all your integration work.

2. Use a trigonometric substitution to integrate.

(a) (3 marks) $\int \frac{3x^3}{\sqrt{x^2 - 9}} dx$

(b) (3 marks) $\int \sqrt{4x - x^2} dx$

3. Use partial fractions to integrate.

(a) (3 marks) $\int \frac{2x + 9}{x^3 - 6x^2 + 9x} dx$

(b) (3 marks) $\int \frac{18x + 9}{x^4 + 9x^2} dx$

4. Evaluate the limits. If they do not exist, then determine whether they are ∞ or $-\infty$ or neither.

(a) (2 marks) $\lim_{x \rightarrow 0} \frac{\ln(\sec x)}{x^2}$

(b) (2 marks) $\lim_{x \rightarrow 0^+} \left(\frac{3}{x} - \csc x \right)$

(c) (2 marks) $\lim_{x \rightarrow \infty} \left(1 + 2 \sin \frac{1}{x} \right)^x$

5. Determine whether the improper integral converges or diverges and evaluate it if it converges. If it diverges, determine whether it diverges to ∞ or $-\infty$ or neither.

(a) (2 marks) $\int_0^{\infty} \sin^3 x \cos x \, dx$

(b) (3 marks) $\int_0^1 (\ln x + 2) \left(\frac{1}{2\sqrt{x}} \right) dx$