

## M362K Homework Assignment 1 (Diagnostic Quiz)

The prerequisite for M362K is a grade of C- or better in M408D or M408L or M408S; if you are unable to solve any of the problems below, you have some reviewing to do. The section numbers below refer to *Calculus, 6th Edition* by James Stewart. Keywords are included in case you are using a different source.

### Appendix E, sigma notation. (4 points each)

1. Find  $\sum_{i=3}^6 \frac{i+n}{i-2}$ .
2. Calculate  $\sum_{i=1}^N i$ .
3. Compute  $\sum_{i=1}^N \frac{1}{5^i}$ .

### Sections 7.3, 7.4, logarithmic functions. (4 points)

4. Evaluate the limit  $\lim_{n \rightarrow \infty} \left(1 - \frac{2}{n}\right)^n$ .

### Section 7.2, exponential functions. (3 points)

5. Evaluate the limit  $\lim_{t \rightarrow \infty} e^{-t}$ .

### Section 5.2, definite integrals. (5 points)

6. Let  $f$  be a non-negative continuous function on the interval  $[0, 2]$ . Use a diagram to explain why  $0.2 \times f(1)$  is approximately equal to

$$\int_{0.9}^{1.1} f(x) dx.$$

Why would  $0.1 \times f(0.95) + 0.1 \times f(1.05)$  be a better approximation?

### Sections 7.2 and 5.5, exponential functions, integration by substitution. (4 points)

7. Evaluate the integral  $\int e^{-\frac{x}{2}} dx$ .

### Section 8.1, integration by parts. (5 points)

8. Evaluate the integral  $\int x^2 e^{-5x} dx$ .

### Section 8.8, improper integrals. (5 points)

9. Evaluate the integral  $\int_3^{\infty} x e^{-7x} dx$ .

### Sections 5.2 and 8.8, definite integrals, improper integrals. (4 points)

10. Let  $f(x) = \begin{cases} 0 & \text{if } x \leq 0 \\ x & \text{if } 0 < x \leq 1 \\ 1 & \text{if } 1 < x \leq 5 \\ 0 & \text{if } x > 5 \end{cases}$ .

Find  $\int_{-\infty}^4 f(x) dx$ .

### Section 5.3, the Fundamental Theorem of Calculus. (4 points)

11. Find  $\frac{d}{dx} \int_0^x e^{t^2} \sin t \, dt$ .

### Section 12.10, Taylor and Maclaurin Series. (4 points)

12. Find the sum  $\sum_{i=0}^{\infty} \frac{4^i}{i!}$ .