Test 1 Wednesday May 20

Homework problems are not to be handed in. Do them to prepare for the test.

Calculus Review

1. $\int_0^3 \frac{1}{t^3} dt$ [answ: 4/9]

2. $\int_0^\infty e^{-\theta x} dx$, where $\theta > 0$. [answ: $1/\theta$]

3. $\int_0^\infty x e^{-x} dx$ [answ: 1]

4. Let $f(x,y) = \begin{cases} xy^2 & \text{for } x < y \\ 0 & \text{elsewhere} \end{cases}$. Find $\int_0^1 \int_0^1 f(x,y)\, dy\, dx$. [answ: 1/10, **not** 1/6]

5. $\frac{d}{dx}(xe^x)$ [answ: $(1+x)e^x$]

6. $\frac{d}{dt}(e^{\lambda(e^{t^2-1})})$ [answ: $2\lambda t e^{t^2+\lambda(e^{t^2-1})}$]

7. Find the maximum or minimum of $f(x) = e^{-\frac{1}{2}(x-\mu)^2}$ [answ: max at $x = \mu$]

8. $\sum_{k=0}^\infty \frac{1}{2^k}$ [answ: 2]

9. For $0 < a < 1$, find $\sum_{k=j}^\infty a^k$ [answ: $\frac{a^j}{1-a}$; prove it.]

10. For $\lambda > 0$, find $\sum_{k=0}^\infty \frac{\lambda^k e^{-\lambda}}{k!}$ [answ: 1]

Chapter One: You are responsible for the Basic Principle of Counting (Theorem 1.2). You are not responsible for proving Theorem 1.2, but you *are* responsible for how Theorems 1.3, 1.4 and 1.5 follow from 1.2. You can skip Theorem 1.6 (and 1.8, which is equivalent), but you must know Theorems 1.7 and 1.9 by heart; they are important later. You are not responsible for the proofs of 1.7 and 1.9. Theorems 1.10, 1.11 and 1.12 you can forget.

Exercises: 1.6, 1.7, 1.14, 1.17, 1.25, 1.32, 1.37, 1.43