Week 11 Wednesday

March 20, 2019 7:43 AM

Integral of the Day

$$\int \frac{3x}{4-2x^2}\,dx$$

Want $\int u^n du$ or $\int \frac{du}{u}$ or $\int e^u du$

or $\int \sin u\,du$, $\int \cos u\,du$, 8 others on formula sheet

or $\int \frac{du}{\sqrt{a^2-u^2}}$, $\int \frac{du}{a^2+u^2}$ "Inverse Trig"

- "Integration by Parts" and "Partial Fractions" will be indicated, if applicable

$$\int \frac{3x}{4-2x^2}\,dx$$

$u = 4-2x^2$

$du = -4x\,dx$

$\frac{du}{-4} = x\,dx$

$-\frac{3}{4}du = 3x\,dx$

$$= -\frac{3}{4}\int \frac{du}{u}$$

$$= -\frac{3}{4}\ln|u| + C$$

$$= -\frac{3}{4}\ln|4-2x^2| + C$$

Section 4 Cont'd

Ex 4. Suppose you want to insure a \$2,000 tablet against theft for one year by paying a premium m. The probability of theft is 4.7%.
a) Find the probability distribution of the insurance company's gain
b) Find the premium if the insurance company expects to gain \$40

a) X = insurance company's gain (\$)
= premium − payout

	x	$P(x)$
theft	$m-2000$	0.047
no theft	m	0.953

b) expect to gain \$40 ← expected value or average

μ or $E(x) = 40$

$(m-2000)0.047 + m(0.953) = 40$

$0.047m - 94 + 0.953m = 40$

$m - 94 = 40$

$m = 134$

Premium = \$134

Section 5 Binomial and Poisson Problems

Binomial Problems:

X = # successes in a series of independent, identical success/failure trials

n = # trials

p = probability of success on 1 trial

q = " failure " $q = 1-p$

$P(x \text{ successes}) = (nCx)p^x q^{n-x}$ ← Formula Sheet

Ex 1. Roll a die 13 times. Find the probability of getting at most three 2's or 3's.

BINOMIAL (repeated trials)

X = #successes = # 2's or 3's

$n = 13$

$p = P(2 \text{ or } 3) = \frac{2}{6} = \frac{1}{3}$

$q = 1 - \frac{1}{3} = \frac{2}{3}$

P(at most 3 successes)

$= P(X \leq 3)$

$= P(X=0) + P(X=1) + P(X=2) + P(X=3)$

$\boxed{(nCx)\, p^x\, q^{n-x}}$

$= (13C0)\left(\frac{1}{3}\right)^0\left(\frac{2}{3}\right)^{13} + (13C1)\left(\frac{1}{3}\right)^1\left(\frac{2}{3}\right)^{12}$

$+ (13C2)\left(\frac{1}{3}\right)^2\left(\frac{2}{3}\right)^{11} + (13C3)\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^{10}$

13C0 = 1, 13C1 = 13, 13C2 = 78, 13C3 = 286

≈ 0.32

13C2

13 2nd F nCr 2 =

Section 1