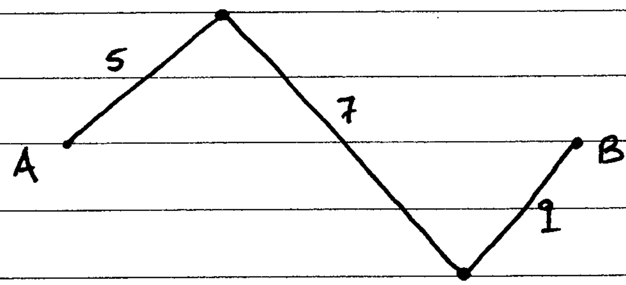
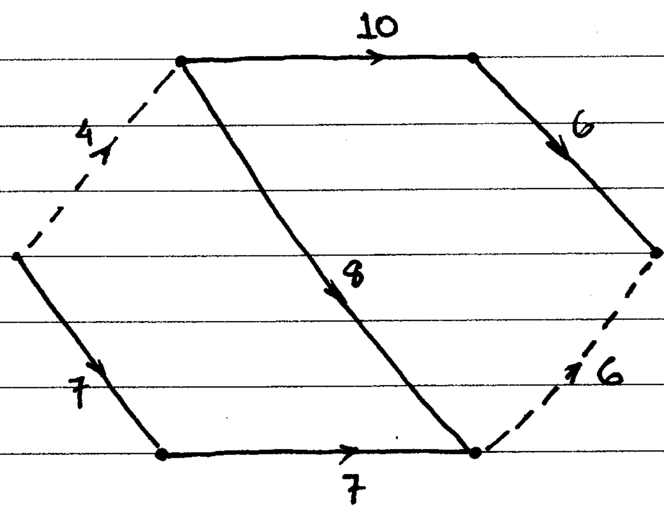
11/21/2000
IST 230

HOMEWORK #12

Problem 1:
Pg 270-271
#8 :



#14 :



The minimal cut is given by the dashed lines.
The maximal flow from A to B is 4 + 6 = 10,
i.e.
the sum of the cut edge values.

Problem # 2

Pg 279

#18) If the k^{th} step of the algorithm takes 2^k seconds to execute, then to execute 40 steps we will require

$$\sum_{k=1}^{40} 2^k \text{ seconds} . = .874 \times 10^{12} \text{ seconds}$$

However, this does not take into account the speed of the computer, i.e, 10^9 operations/second.
Therefore, had the question be framed as:
The k^{th} step takes 2^k operations to perform, then time required to perform 40 operations will be:

$$\frac{1}{10^9} \sum_{k=1}^{40} 2^k = 0.61 \text{ hours}.$$

Pg - 280

#26) By Stirling's formula:

$$5! = \sqrt{10\pi} \left(\frac{5}{e}\right)^5 = 118.0192$$

Using series:

$$5! = \sqrt{10\pi} \left(\frac{5}{e}\right)^5 \left(1 + \frac{1}{12 \times 6} + \frac{1}{288 \times 6^2}\right)$$

$$= 119.67$$

$5! = 120$

% error = (i) for formula: $\frac{120 - 118.0192}{120} \times 100$

$\boxed{= 1.65\% \quad \text{ANS}}$

(ii) for series : $\frac{120 - 119.67}{120} \times 100$

$\boxed{= 0.275\% \quad \text{Ans}}$

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By Stirling's Formula:

$$12! = \sqrt{24\pi}\left(\frac{12}{e}\right)^{12} = 475687486.4728$$

Using Series:

$$12! = \sqrt{24\pi}\left(\frac{12}{e}\right)^{12}\left(1 + \frac{1}{12 \times 13} + \frac{1}{288 \times 13^2}\right)$$

$$= 478746538.5616$$

$12! = 479001600$

% error

(i) for formula :	0.69%
(ii) for series:	0.053%

ANS

Problem #7

Pg 309

#10) $n=6$, $\cancel{P(X=/3)}$ $P(x \leq 2)$

$$P(x \leq 2) = \binom{6}{0}\left(\frac{1}{2}\right)^6 + \binom{6}{1}\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^5 + \binom{6}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^4$$

$$\boxed{= \frac{11}{32} \quad \underline{\text{Ans}}}$$

12) $n=8$, $P(x \leq 3)$

$$P(x \leq 3) = \binom{8}{0}\left(\frac{1}{2}\right)^8 + \binom{8}{1}\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)^7 + \binom{8}{2}\left(\frac{1}{2}\right)^2\left(\frac{1}{2}\right)^6$$

$$+ \binom{8}{3}\left(\frac{1}{2}\right)^3\left(\frac{1}{2}\right)^5$$

$$= \frac{1}{256} \times 93 \qquad \boxed{= \frac{93}{256} \quad \underline{\text{Ans}}.}$$

16) $n=5$, $P(x=4)$

Let p correspond to the probablity of 'X'

Then $P(X=4) = \binom{5}{4}(0.3)^4(.7)^1$

$$\boxed{= 0.02835 \quad \underline{\text{Ans}}.}$$

p. 309

26)

$P(40 \leq x \leq 60)$ out of 100

$$= P\left(\frac{40-50}{5} \leq z \leq \frac{60-50}{5}\right)$$

$= P(-2 \leq z \leq 2)$ (using Z scores)

could also be done w/ pascal's triangle, but would be very hard

$$\sum_{i=0}^{20} \binom{40+i}{100} \Big/ 2^{100}$$

$\boxed{= 0.95450 \text{ Ans}}$

HWK12
20 NOV 2000
JR

When people appear to solve the Traveling Salesman problem they don't solve it in $O(2^N)$ time. Why not?

2^N time is a long time. When people 'solve' it, they are usually satisficing, or finding a good solution. Genetic algorithms & simulated annealing generally do not find the best answer, as well. They tend to find pretty good answers.

So, unless people ~~are~~ have some hidden talent, they will have to either take $O(2^N)$ time, or else just return a good answer.

Problem #3
Pg-275.

The solution has been taken from the book 'DISCRETE MATHEMATICAL STRUCTURES' by Kolman, Busby, Ross, pg. 178.

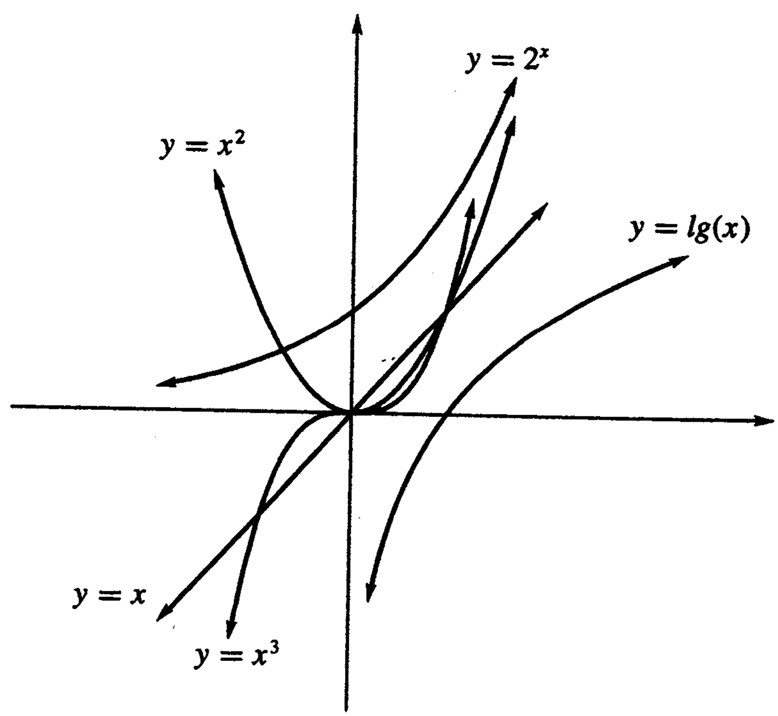

Figure 5.4