Question 1

Initial State:

Level(low) ∧ At(monkey, A) ∧ At(bananas, B) ∧ At(box, C)

Goal state:

Have(bananas)

Predicate Forms:

Name	Description
Level(l)	Level(high) = monkey is on the box, Level(low) = otherwise
At(o, x)	o is monkey, box, or bananas; x is A, B, or C
Have(bananas)	the monkey has the bananas

Operators:

Name	Preconditions	Add List	Delete List
Move(x, y)	At(monkey, x) ∧ Level(low	At(monkey, y)	At(monkey, x)
MoveBox(x, y)	At(box, x) ∧ Level(low)	At(box, y)	At(box, x)
ClimbUp(x)	At(monkey, x) ∧ At(box, x) ∧ Level(low)	Level(high)	Level(low)
ClimbDown(x)	At(monkey, x) ∧ At(box, x) ∧ Level(high)	Level(low)	Level(high)
TakeBananas(x)	At(monkey, x) ∧ At(box, x) ∧ At(bananas, x) ∧ Level(high)	Have(bananas)	

Solution Plane

S0	Level(low) ∧ At(monkey, A) ∧ At(bananas, B) ∧ At(box, C)
	Move(A, B)
S1	Level(low) ∧ At(monkey, B) ∧ At(bananas, B) ∧ At(box, C)
	MoveBox(C, B)
S2	Level(low) ∧ At(monkey, B) ∧ At(bananas, B) ∧ At(box, B)
	ClimbUp(B)
S3	Level(high) ∧ At(monkey, B) ∧ At(bananas, B) ∧ At(box, B)
	TakeBananas(B)
S4	Level(high) ∧ At(monkey, B) ∧ At(bananas, B) ∧ At(box, B) ∧ Have(bananas)

Question 2

One problem does exist in this partial order plan. The problem is that there is no casual link between Make(Cake) and its required precondition At(Home). This means that an attempt Make(Cake) would happen At(Ralphs).

Question 3

1. P(toothache) = 0.108 + 0.012 + 0.016 + 0.064 = 0.2

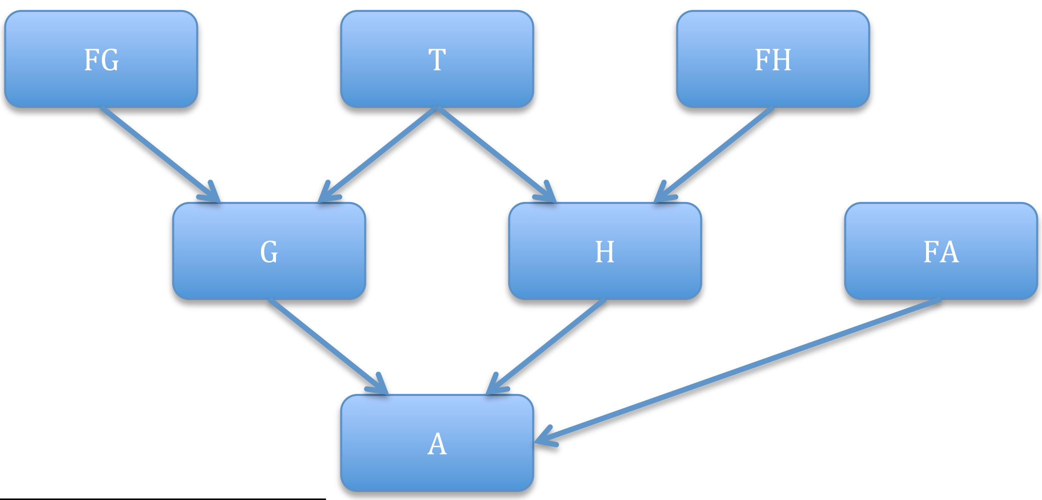
2. P(toothache ∧ catch) = 0.108 + 0.016 = 0.124

3. P(cavity | catch) = (0.108 + 0.072) / (0.108 + 0.072 + 0.016 + 0.144) = 0.529

Question 4

a. Variables: A (alarm sounds), FA (alarm is faulty), and FG (gauge is faulty), and the multi-valued nodes G (gauge reading) and T (actual core temperature)

b. Yes. This network is a polytree.



c.

T	FG	P(G|T,FC)
Normal	T	1-(y/100%)
Normal	F	1-(x/100%)
High	T	1-(y/100%)
High	F	1-(x/100%)

d.

G	FA	P(G|T,FC)
Normal	T	0
Normal	F	0
High	T	0
High	F	1

e. P(High | FA=F, FG=F) = 1 * 1-(x/100%)

f. gauge is useless when CM >= CS
p * CM * [1-(x/100%)] >= CS
x <= 100% * [1 + CS / (p * CM)]

g. (see network above)

h. I think by accurate you mean reliable. If so, then yes, adding a second gauge definitely means that more reliable gauges are need! Since only one gauge is needed to activate the alarm, the probably of the alarm going off because of a faulty gauge is the *sum* of how unreliable the gauges are. In other words, the alarm is more likely to be caused by a faulty gauge with each additional gauge so they better be more reliable if you wish to continue having a useful alarm.