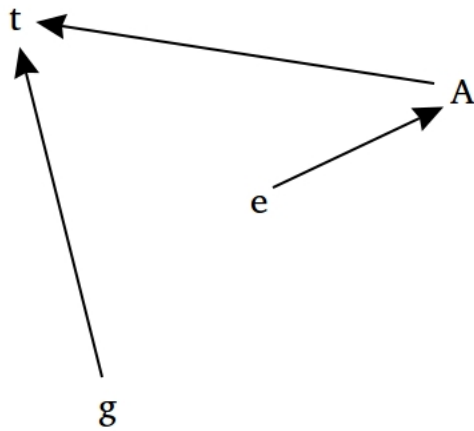


C241 HW9

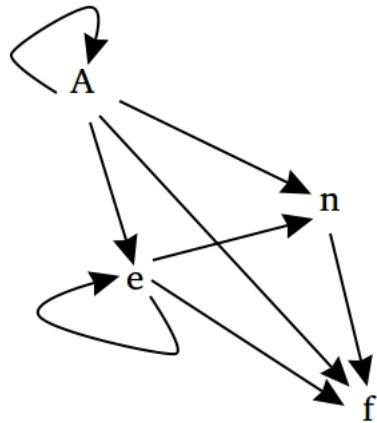
Zac Monroe

October 2018

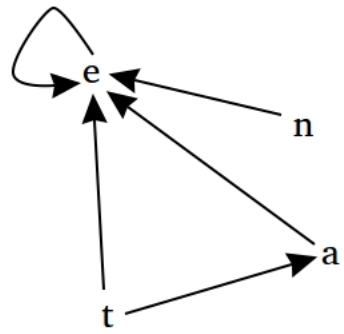
1. (a) Here is my toy model for part (a).



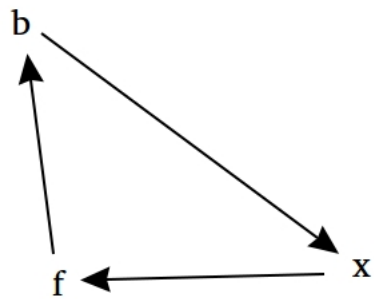
- (b) Here is my toy model for part (b).



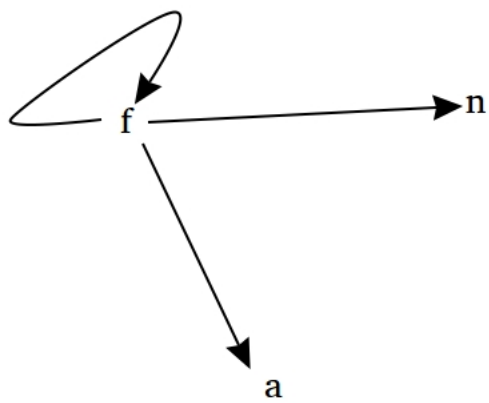
(c) Here is my toy model for part (c).



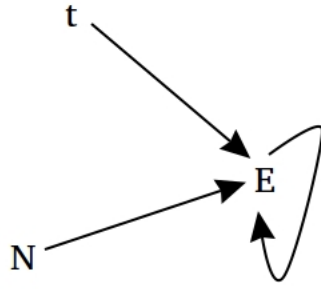
(d) Here is my toy model for part (d).



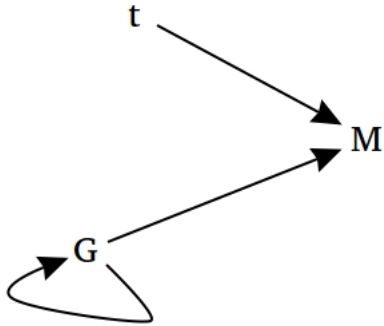
(e) Here is my toy model for part (e).



(f) Here is my toy model for part (f).



(g) Here is my toy model for part (g).



2. (a) $\forall x \exists y \neg D(x, y)$
- (b) $\forall x \exists y \neg D(y, x)$
- (c) $\exists x \forall y \neg M(x, y)$
- (d) $\exists x \neg \forall y D(x, y)$
- (e) $\exists x \exists y (S(x) \wedge \neg D(x, y))$
- (f) $\neg \forall x \exists y D(x, y)$
- (g) $\neg \forall x \forall y D(x, y)$
- (h) $\exists x \exists y (R(x) \wedge \neg D(x, y))$
- (i) $\neg \exists x \forall y D(x, y)$
- (j) $\neg \exists x \forall y (S(x) \wedge D(x, y))$
- (k) $\neg \exists x \forall y (D(x, y) \wedge R(y))$
- (l) $\forall x \neg \exists y (D(x, y) \wedge R(y))$

3. (a) No function is dependent on any function.
- (b) No function has more arguments than all functions.
- (c) Not all functions are dependent on every function.
- (d) Some function is dependent on no function.
- (e) All recursive functions have some function on which they are not dependent.
- (f) All recursive functions have some function on which they are not dependent.
- (g) Not all string-returning functions have more arguments than every function.
- (h) No recursive function is dependent on all functions.