

Contents

1 WSP_OR Theory

Built: 08 July 2019

Parent Theories: AND_FDEP

1.1 Definitions

[indep_var_set_WOR_def]

```
⊢ ∀ Y X_a X_d Z p t.  
  indep_var_set_WOR Y X_a X_d Z p t ⇔  
  indep_vars p (λ i. lborel)  
    (λ i.  
      if i = 0 then (λ s. real (X_d s))  
      else if i = 1 then (λ s. real (Y s))  
      else (λ s. real (Z s)) {0; 1; 2} ∧  
  indep_sets p  
    (λ i.  
      {if i = 0 then DFT_event p (WSP Y X_a X_d) t  
       else DFT_event p Z t}) {0; 1} ∧  
  random_variable (λ s. real (X_a s)) p  
  (m_space lborel, measurable_sets lborel)
```

[UNIONL_def]

```
⊢ (UNIONL [] = {}) ∧ ∀ s ss. UNIONL (s::ss) = s ∪ UNIONL ss
```

1.2 Theorems

[IN_REST]

```
⊢ ∀ x s. x ∈ REST s ⇔ x ∈ s ∧ x ≠ CHOICE s
```

[IN_UNIONL]

```
⊢ ∀ l v. v ∈ UNIONL l ⇔ ∃ s. MEM s l ∧ v ∈ s
```

[prob_WSP_OR]

```
⊢ ∀ Y X_a X_d Z p t f_xy f_y f_cond.  
  DISJOINT_WSP Y X_a X_d t ∧  
  (∀ s. ALL_DISTINCT [Y s; X_a s; X_d s; Z s]) ∧  
  All_distinct_events p [WSP Y X_a X_d; Z] t ∧  
  rv_gt0_ninfinity [Y; X_d; X_a; Z] ∧ 0 ≤ t ∧ 0 ≤ t ∧  
  (∀ x y.  
    cond_density lborel lborel p (λ s. real (X_a s))  
    (λ s. real (Y s)) y f_xy f_y f_cond) ∧  
    den_gt0_ninfinity f_xy f_y f_cond ∧  
    cont_CDF p (λ s. real (X_d s)) ∧  
    measurable_CDF p (λ s. real (X_d s)) ∧  
    indep_var_set_WOR Y X_a X_d Z p t ⇒  
    (prob p (DFT_event p (D_OR (WSP Y X_a X_d) Z) t) =
```

```

pos_fn_integral lborel
  ( $\lambda y.$ 
    indicator_fn { $u \mid 0 \leq u \wedge u \leq t\}$   $y \times f_y y \times$ 
      pos_fn_integral lborel
        ( $\lambda x.$ 
          indicator_fn { $w \mid y < w \wedge w \leq t\}$   $x \times$ 
             $f_{cond} y x)) +$ 
      pos_fn_integral lborel
        ( $\lambda y.$ 
           $f_y y \times$ 
          (indicator_fn { $u \mid 0 \leq u \wedge u \leq t\}$   $y \times$ 
            CDF p ( $\lambda s.$  real ( $X_d s\right)) y))) +$ 
        CDF p ( $\lambda s.$  real ( $Z s\right)) t -
      (pos_fn_integral lborel
        ( $\lambda y.$ 
          indicator_fn { $u \mid 0 \leq u \wedge u \leq t\}$   $y \times f_y y \times$ 
            pos_fn_integral lborel
              ( $\lambda x.$ 
                indicator_fn { $w \mid y < w \wedge w \leq t\}$   $x \times$ 
                   $f_{cond} y x)) +$ 
              pos_fn_integral lborel
                ( $\lambda y.$ 
                   $f_y y \times$ 
                  (indicator_fn { $u \mid 0 \leq u \wedge u \leq t\}$   $y \times$ 
                    CDF p ( $\lambda s.$  real ( $X_d s\right)) y))) \times$ 
                  CDF p ( $\lambda s.$  real ( $Z s\right)) t)$$ 
```