CIVE-716 EROSION AND SEDIMENTATION
FINAL EXAM
Thursday, December 15, 2011, 2:00 -3:50 pm **Name:** Julian

Problem #1 (8 points) - *Derivations*

1. Derive the relationship to obtain the dry specific weight of a sediment mixture given the porosity and specific weight of solids; and
2. What is the Riemann condition that we used in Chapter 4?

Problem #2 (12 points) - *English Units*

From the data presented in the Case Study 12.1 for Tarbela Dam on the Indus River:

(a) what is the suspended sediment discharge in tons per day at a discharge of 50,000 cfs;
(b) what is the dry specific weight of clay in lb/ft^3 when submerged for 200 years; and
(c) use Eq. 12.8 to find the trap efficiency of 2 μm particles at a discharge of 50,000 cfs.

Problem # 3 (80 points) - *SI Units*

Consider the Niobrara River: width = 21 m, depth = 0.5 m, discharge Q = 11 m^3/s, d_{50} = 0.3 mm. Calculate the following at a temperature at 15°C, angle of repose ϕ = 34° and slope 170 cm/km:

1.	Kinematic viscosity	υ	=	1.14×10^{-6}	m^2/s
2.	Shear velocity in m/s	u_*	=	0.091	m/s
3.	Dimensionless grain diameter	d^*	=	6.95	
4.	Settling velocity	ω	=	0.042	m/s
5.	Critical shear stress in Pa.	τ_c	=	0.20	Pa
6.	Manning n	n	=	0.024	
7.	Froude number	Fr	=	0.47	
8.	Darcy-Weisbach f	f	=	0.061	
9.	Grain roughness height	k_s'	=	0.0018	m
10.	Transport-stage parameter	T	=	10.3	
11.	Grain Shields parameter	τ_*	=	0.463	
12.	Dune height from van Rijn	Δ	=	0.087	m
13.	Bed load discharge from MPM using τ_*'	Q_{bm}	=	215	met.tons/d
14.	Near bed sediment concentration	Ca	=	$=10^6$	mg/l
15.	Rouse number assuming κ = 0.4 and β_s = 1	Ro	=	615	
16.	Sediment concentration at mid-depth in mg/l	$C_{0.5}$	=	494	mg/l
17.	Bed material discharge from Shen-Hung's method	Q_{bm}	=	369	met.tons/d
18.	Length scale for lateral mixing	X_t	=	10	km
19.	Trap efficiency over 200 m	T_E	=	0.99	
20.	What suspended load sampler(s) would you use?	Sampler(s):		DH-48	

IMPORTANT! Attach calculations to test. *Happy Holidays!*