Student number	point total	req total	extra total	R0 UV (0.5p)	R1 ortho, ambient (1.5 p)	R2 Depth vis (1p)	R3 Perspective (1.5p)	R4 Phong, lights (3p)	R5 Planes (1p)	R6 Triangles (1.5p)	R7 Shadows (1.5p)	R8 Reflection (1.5p)	R9 AA (2p)	mod	notes / extras / ...	Refraction (1-2p)	Simple fog (1p)	More primitives (3p)	Arbitrary filters (1-3p)	Stereo cubemap (4p+)	transparent shadows (1.5p)	Fresnel (1p)	Textures (2-4p)	Normal mapping (2-3p)	CSG (4-5p)	Other extras (?p)	What other extras
225157	0	0	0																								
270034	0	0	0																								
293846	0	0	0																								
295323	0	0	0																								
345642	0	0	0																								
348843	0	0	0																								
349936	18	15	3	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R0: scaling is wrong - ray_xy is [-1,1] (-0p).			3									
350475	4.5	4.5	0	0.5	1.5	1	1.5																				
352091	0	0	0																								
353980	0	0	0																								
354439	3.5	3.5	0	0.5	1.5	1	0.5								R3: using dv instead of dv.normalized(), also unnecessary fovangle in dv formula												
355593	0	0	0																								
356026	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
361749	0	0	0																								
369181	6.5	6.5	0	0.5	1.5	1	1.5	2							R4: you need to compute the reflection of the 'to_light' direction, and compare that to the '-r.dir' direction.												
372660	0	0	0																								
387370	0	0	0																								
425575	0	0	0																								
425614	0	0	0																								
426419	0	0	0																								
427489	2	2	0	0.5	1.5																						
428022	0	0	0																								
429487	0	0	0																								
430829	4.5	4.5	0	0.5	1.5	1	1.5																				
457598	6.5	6.5	0	0.5	1.5	1	1.5	2							R4: r should be reflection of -L, not v. Also: using specular from below local horizon (if ds_light is neg., just return zero)												
460297	0	0	0																								
464772	0	0	0																								
46477D	0	0	0																								
46596K	0	0	0																								
474199	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
474322	0	0	0																								
474458	11.5	11.5	0	0.5	1.5	1	1.5	2.5	1	1	1.5	1			R4: specular light from below local horizon. R6: buggy on my end as well												
474898	3.5	3.5	0	0.5	1.5	0.5	1								R2: hard-coded depth range. R3: non-standard formula, results differ sligtly												
475389	0	0	0																								
475813	0	0	0																								
475910	0	0	0																								
477329	17	14.5	2.5	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: directional light dir flipped, using specular contribution from below local horizon. Box seems fine, transform breaks shading			2.5									
477811	14.5	14.5	0	0.5	1.5	1	1.5	3	1	1	1.5	1.5	2		R6: triangle normals flipped - shade_back not needed for any of our scenes												
478328	0	0	0																								
478470	0	0	0																								
478687	0	0	0																								
479505	17	15	2	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2			2											
479589	4.5	4.5	0	0.5	1	1	1		1						R1, R3: looks generally OK, but scales don't match reference												

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479741	7.5	7.5	0	0.5	1.5	1	1.5	3							The r4 point light scene won't look right without the transforms extra												
480086	0	0	0																								
480248	0	0	0																								
480714	7.5	7.5	0	0.5	1.5	1	1.5	1					2		R4: directional light direction flipped, not using dot product and diffuse color in diffuse shading												
480798	0	0	0																								
481577	0.5	0.5	0	0.5																							
493840	14	14	0	0.5	1.5	1	1.5	2	1	1.5	1.5	1.5	2		R4: you want dot(r, -ray.direction) in the specular part. R9: % 100 wont give properly distributed random numbers, use %RAND_MAX instead												
506300	12	12	0	0.5	1.5	1	1.5	2.5	1	1	1.5	1.5			R4: specular missing local horizon check. R6: returned triangle normal not normalized												
508285	6.5	6.5	0	0.5	1.5	1	1.5	2																			
51620U	0	0	0																								
524926	0	0	0																								
525417	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
525491	0	0	0																								
525941	0	0	0																								
526050	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
526319	5.5	5.5	0	0.5	1.5	1	1.5		1						R5 will be dark without phong (only ambient)												
526775	0	0	0																								
527143	0	0	0																								
527389	0	0	0																								
528867	0	0	0																								
528883	12	12	0	0.5	1.5	0.5	1.5	2.5	1	1.5	1.5	1.5			R2: not correctly scaled. R4: accumulating specular from below local horizon												
529196	0	0	0																								
529303	0	0	0																								
530185	0	0	0																								
530363	0	0	0																								
530619	0	0	0																								
530648	0	0	0																								
530868	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
530981	21.5	13.5	7	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0.5	1	R9: jittered doesn't use subpixels, uniform generates points on a circle. Xform: normals look broken. Spotlight scene looks awesome! Thanks for reporting the lectures slides error, it will be fixed! (+1p)	2		2.5				1				1.5	Spotlight (1.5)
540094	0	0	0																								
540654	0	0	0																								
544566	5	5	0	0.5	1.5	1	1	0	1	0					R3: ray initialized wrong (should be Ray (center, r)), aspect ratio fix also seems wrong												
549040	0	0	0																								
549163	0	0	0																								
55055P	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														

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552794	6	6	0	0.5	1.5	1	1.5	1.5							R3: your result matches the reference exactly on my end (using bat). Note: our output images are always square so no aspect ratio is required												
552969	0	0	0																								
554598	14.5	14.5	0	0	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R0: not implemented												
563068	2.5	2.5	0	0.5	0.5	0.5	1	0							R1: transposed and too small. R2: not correct (try running render_all.bat). R3: works after replacing origin with this->center. R4: not substantial enough for points												
576149	0	0	0																								
585716	0	0	0																								
586333	0	0	0																								
586702	0.5	0.5	0	0.5																							
586980	6	6	0	0.5	1.5	1	1.5	1.5																			
587316	0	0	0																								
587471	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
588289	12.5	12.5	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1			R8: coputing reflection using ray origin, not direction. Mirror reflection function has unnecessary negation at the end												
589291	0	0	0																								
589343	0	0	0																								
589848	0	0	0																								
590921	0	0	0																								
591904	4.5	4.5	0	0.5	1.5	0.5	1.5						0.5		R2: incorrect scaling												
591946	0	0	0																								
592929	0	0	0																								
593274	7.5	7.5	0	0.5	1.5	1	1.5	3																			
593847	0	0	0																								
594435	0	0	0																								
595926	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
595997	0	0	0																								
596747	0	0	0																								
597429	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5			R8: you want to add (+=) reflected light, not overwrite (-0p)												
597623	10.5	12.5	0	0.5	1.5	0.5	1.5	3	1	1.5	1.5	1.5	0	-2	R2: somewhat incorrect normalization - values can end up outside [0,1]. Your R9 attempt leads into crashing with RegularSampler due to division by zero. Since this is the default sampler, the rendering scripts were unusable before a fix. The GUI does not use RegularSampler by default so this was not visible there unless one manually chooses RegularSampler.												
597937	17.5	14	3.5	0	1.5	1	1.5	3	1	1.5	1	1.5	2		R0: does not match reference. R7: separate shadow hit struct needed per light. Xform: need to transform pos with w=1 to get translation effects. Refraction: code looks OK but results don't quite match ref	1.5		2								
602851	0	0	0																								

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602893	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5															
603096	7.5	7.5	0	0.5	1.5	1	1.5	3							R4: lighting missing when running bat files												
603245	4.5	4.5	0	0.5	1.5	0.5	1	1							R2: not correctly scaled. R3: normalizedImageCoordinateFromPixelCoordinate has unnecessary *0.5 (needs to scale size inside of ortho raygen instead). R4: dir_to_light wrong for point and directional, v in phong should be -ray.dir												
604095	26	14.5	11.5	0	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R0: using tmin instead of hit.t. Transform: need explicit w=0 when transforming normal	2	1	2.5	3			1	2				
604273	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: specular from below local horizon (lower hemisphere, occluded by surface)												
606064	20	15	5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2			2		3									
608949	0	0	0																								
609155	0	0	0																								
609249	0	0	0																								
612472	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
612498	0	0	0																								
612870	20	15	5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2			2		3									
614577	0	0	0																								
614580	0	0	0																								
621308	11.5	11.5	0	0.5	1.5	1	1.5	3	1	1.5	1.5																
628835	9	9	0	0.5	1.5	1	1.5	2.5	1	1	0	0	0		R4: you are shading points for which the light is coming from under the local horizon ("behind"). Need to have separate check for this. R6: you are leaving At uninitialized, instead you are setting columns to Ay twice!												
63036R	0	0	0																								
641922	0	0	0																								
646804	0	0	0																								
647764	0	0	0																								
648530	0	0	0																								
648860	0	0	0																								
650191	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
650227	0	0	0																								
650405	0	0	0																								
650560	13.5	13.5	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0.5		R9: only regular												
650942	0	0	0																								
651527	10	10	0	0.5	1.5	1	1.5	3	1	1.5	0	0	0														
651585	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
651637	7.5	7.5	0	0.5	1.5	1	1.5	3	0	0	0	0	0		Point lights seem correct: the scene you mentioned does not work because it needs plane intersections.												
651789	0	0	0																								
652102	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
652131	3	3	0	0.5	1.5	1	0	0	0	0	0	0	0		R2: inverted values (-0p)												
652335	0	0	0																								
652649	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
652898	0	0	0																								
652937	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
653127	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
653596	0	0	0																								

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653693	8.5	8.5	0	0.5	1	1	1	2.5	1	1.5	0	0	0		R1+2: the way you are generating the rays seems overly complicated. The scenes that seem to work have an axis-aligned camera and those that don't do not have that. So there is some issue related to that. R4: you are adding the specular contribution for light rays coming from under the local horizon.												
653871	0	0	0																								
653907	0	0	0																								
653910	0	0	0																								
654595	0	0	0																								
655057	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R4: the handout does state that the particular scene does not work fully with the requirements, but you can observe the point-light falloff regardless.												
655086	14.5	14.5	0	0.5	1.5	0.5	1.5	3	1	1.5	1.5	1.5	2		R2: t not clamped to [min,max]												
655109	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		depth viz code looks OK but results differ from ref, might be a bug somewhere else												
655251	0	0	0																								
655264	0	0	0																								
655471	5.5	5.5	0	0.5	1	1	1.5	1.5	0	0	0	0	0		R1: you should be using the given ambient light value instead of a static 1.0. R4: diffuse part looks reasonable, weird look from the problem of R1.												
655691	0	0	0																								
655853	3	3	0	0.5	1.5	1	0	0	0	0	0	0	0														
656250	2	2	0	0.5	1.5																						
656454	29.5	14.5	15	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: tiny bug - you are using your light_incident value instead of the original incident_intensity in the specular term. Good job with the indirect illumination!	2		3								10	Soft shadows (5p), Indirect illumination (5p)
656616	2	2	0	0.5	0.5	1	0								R1: normalizedImageCoordinateFromPixelCoordinate y coordinate wrong (-1 only to part of the expression). Camera plane side also 2x the correct width. R3: not using fov, computed dir not used at all												
657291	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: you should consider contributions from lights that lie under the local horizon.												
657314	0	0	0																								
657327	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
657482	0	0	0																								
657796	18	15	3	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2					3									
657893	0	0	0																								
659914	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0														
660246	18	15	2	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2	1	Thank you for reporting the lecture slides error, it will be fixed (+1p)	2											
660877	0	0	0																								

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660893	0	0	0																								
663191	0	0	0																								
663272	0	0	0																								
665380	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0														
665898	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0														
666172	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0														
666350	5.5	5.5	0	0.5	1.5	0.5	1.5	1.5							R2: not clamped to depth_max. R4: only diffuse												
666680	3.5	3.5	0	0.5	1	1	1	0	0	0	0	0	0		R1: missing a factor of 2 - size here means the full length/width of the screen. R3: don't need to move the origin - it's directly the center variable.												
667249	14	14	0	0.5	1.5	1	1.5	2	1	1.5	1.5	1.5	2		R4: you are taking light contribution from lights under the local horizon, r4_exp_variations_back does not look right. Point-lights: you are using distance 0 for your attenuation computation: you compute the actual distance only _after_ the attenuation!												
67137M	0	0	0																								
67627H	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: dir_to_light unnormalized with point-lights.												
677734	0	0	0																								
678089	0	0	0																								
68933B	0	0	0																								
69247N	0	0	0																								
700436	0	0	0																								
705570	73.5	15	58.5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		Distribution ray tracing: you are not aligning the hemisphere with the local normal with a transformation. Interactive editing is a tad sluggish but does what one would expect. You were not kidding about using alot of time on the extras. Impressive!	2	1	3	3	4	1.5	1			4	39	Custom skybox (1p), Soft shadows, area lights (5p), spotlight (1p), Poisson disk sampler (2p), Implicit surface (2p), depth-of-field (2p), distribution ray tracing (1p), blobs (4p), motion blur (6p), Interactive editing of scale, location, orientation (5p), Wood shader (2p), GPU tracer (8p)
706566	4.5	4.5	0	0.5	0	0	1.5	1.5	1	0	0	0	0		R1: the images are completely broken due to a missing FW::Vec2f in normalizedImageCoordFromPix-function. R3: dir_to_light is inverted + additionally you are doing the shading twice if there is no shadows. If shadows are on, you do the shading always anyway (though only once)?												
708784	30	15	15	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2			2		3								10	Documentation on how to set up the course environment on linux (10p)
708904	0	0	0																								

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708920	13.5	13.5	0	0.5	1.5	0.5	1.5	2.5	1	1.5	1.5	1.5	1.5		R2: you are not normalizing the ray to unit length and hence your hit.t-vals are really small -> bright depth images. R4: dir_to_light unnormalized with point-lights. R9: the way you compute the y-offsets looks odd: use n/m_dim.												
708933	0	0	0																								
709291	5.5	5.5	0	0.5	1.5	1	0.5	1.5	0.5	0	0	0	0		R3: no need to shift the origin of the ray - its just the variable center. The true direction of the ray would be your vector origin. R4+5: reasonable attempts.												
709628	13	13	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	0														
710086	7	7	0	0.5	1.5	1	1.5	2.5	0	0	0	0	0		R4: you need to compute the dot between the reflected camera ray direction and the light ray direction, not between reflected camera ray and camera ray!												
710497	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
710743	9.5	9.5	0	0.5	1.5	1	1.5	2.5	1	1.5	0	0	0		R4: dir_to_light unnormalized with point-lights: this causes the extreme brightness.												
710976	3	3	0	0.5	1.5	1	0	0	0	0	0	0	0														
711182	2	2	0	0.5	1.5	0	0	0	0	0	0	0	0														
711467	20	15	5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R9: you seem to have the x and y -coords of the samples reversed wrt the reference (-0 p)	2		3									
711551	7.5	7.5	0	0.5	1.5	1	1.5	3	0	0	0	0	0														
711810	4.5	4.5	0	0.5	1.5	1	1.5	0	0	0	0	0	0														
711904	0	0	0																								
712550	2	2	0	0.5	1.5	0	0	0	0	0	0	0	0														
712686	0	0	0																								
712819	4	4	0	0.5	1.5	1	1	0	0	0	0	0			R3: looks like you are moving the ray origin a little when generating rays. It should merely be the camera center. The movement seems to be really small looking at the images, however the depth image for the perspective camera is a little too bright. R4: a bit too broken for points.												
712958	0	0	0																								
713672	0	0	0																								
714985	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: you are multiplying by incident_intensity twice, once in shade and once in traceRay.												
716080	0	0	0																								
716462	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
716718	0	0	0																								
716860	14	14	0	0.5	1.5	1	1.5	2	1	1.5	1.5	1.5	2		R4: you should consider contributions from lights that lie under the local horizon. Need a separate check for this! dir_to_light is unnormalized for point-lights.												
717377	0	0	0																								

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717474	0	0	0																								
717513	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R0: you were assigning to sample_color instead of pixel color -> blank image due to the typo but idea correct. (-0p). R4: point-light distance is always 1 since you compute a length of a unit vector.												
717539	0	0	0																								
718020	0	0	0																								
718871	0	0	0																								
722427	0	0	0																								
723691	14.5	14.5	0	0.5	1.5	0.5	1.5	3	1	1.5	1.5	1.5	2		R0: you were assigning to sample_color instead of pixel color -> blank image due to the typo but idea correct. (-0p). R1: ray direction for perspectiveCamera is unnormalized -> some really bright depthmaps. R8: there's just an off-by-one in the bounce indexing due to the fact that you decrement it only at the end of the function. R9: Interesting use of % when scaling the random numbers: maybe more standard to just divide by RAND_MAX. Extras: can't really give points for crashing code.												
723905	0	0	0																								
728667	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
728900	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
729132	3.5	4.5	0	0.5	1.5	0	1.5	1	0	0	0	0	0	-1	Missing .sln-files. R1: depth-maps are blank - you don't seem to be using the ray length t at all. R4: direction to light is inverted for directionalLight, unnormalized for point-lights.												
729967	0	0	0																								
730309	0	0	0																								
732080	0	0	0																								
732255	0	0	0																								
732323	0	0	0																								
732336	0	0	0																								
732352	0	0	0																								
732459	12.5	12.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	0		R4: you are taking light contrubution from rays coming from below the local horizon.												
76509T	20	15	5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2			2		3									
765510	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
766331	0	0	0																								
767042	0	0	0																								
767136	0	0	0																								
768504	0	0	0																								
769396	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2														
77388B	11.5	11.5	0	0.5	1.5	1	1.5	3	1	1.5	1.5				Readme doesn't state which assignments were done												
779124	0	0	0																								
780058	0	0	0																								

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780346	12.5	12.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	0		R4: you are taking light contrubution from rays coming from under the local horizon.												
782917	0	0	0																								
783563	0	0	0																								
783709	0	0	0																								
786667	0	0	0																								
78708M	0	0	0																								
787543	0	0	0																								
787640	0	0	0																								
788380	0	0	0																								
788678	0	0	0																								
791982	0	0	0																								
795700	0	0	0																								
795755	0	0	0																								
796039	0	0	0																								
804183	4.5	4.5	0	0.5	1.5	1	1.5																				
829155	0	0	0																								
838191	0	0	0																								
83873J	0	0	0																								
84308F	0	0	0																								
84858E	0	0	0																								
848754	22.5	14.5	8	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: odd boundary effects with specular terms. Looks like there is an unnormalized vector somewhere - this can also be seen in the refraction extra with too bright colors (error accumulates). R9: interesting way of generating the random values: division by RAND_MAX is somewhat more straight-forward. Primitives: normals not normalized after transform -> results in too bright images. Filters single-threaded. Cubemap: somewhat tedious to manually use some third-party software for the construction of the map. There is not too much over the requirements here at the moment.	1.5	1	2	1.5	2							
875170	4.5	4.5	0	0.5	1.5	1	1.5	0	0	0	0	0	0														
875251	0	0	0	0	0	0	0	0	0	0	0	0	0														
875303	0	0	0																								
875617	0	0	0																								
876399	0	0	0																								
877107	0	0	0																								
877152	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R0: you are never actually assigning the uv-visualization to the output picture (-0p). R4: you are taking contribution from light rays coming from under the local horizon.												
878591	15.5	14	1.5	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	1.5		R4: you are taking contribution from light rays coming from under the local horizon. R9: you are using normally distributed samples in JitteredSampler?			1.5								

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878627	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: unnormalized dir_to_light vectors for point lights. R9: Probably a bit inefficient to create a new random number generator object with every sample...												
878889	0	0	0	0	0	0	0	0	0	0	0	0	0														
879105	12	12	0	0.5	1.5	1	1.5	2	1	1.5	1.5	1.5	0		R4: you are taking contribution from light rays coming from under the local horizon. dir_to_light is unnormalized for point lights.												
882134	0	0	0																								
885128	13	13	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	0.5		R0: you were overwriting the assigned uv-map image -> blank image due to the typo but idea correct. (-0p). R4: your point-light distance is 1 since you take the length of a normalized vector!												
886648	10	10	0	0.5	1.5	1	1.5	3	1	0	1.5	0	0														
889645	0	0	0																								
892292	0	0	0																								
898351	0	0	0																								
899130	27	15	12	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		Transform-intersect: normals transformed like positions + unnormalized. Refraction: did not look too closely but some of your refr_color samples had negative values in them probably due to some flipped normal. There may be some issue with the MC sampling since the results are somewhat noisy, but it might just be the specular terms that cause really slow convergence. Good job overall, great to hear that you had a good time!	1		1								10	Soft shadows + sampling for global illumination (10p)
900016	11	11	0	0.5	1.5	0.5	1.5	3	1	1.5	1.5	0	0		R2: you are moving the origin of the ray slighly which results in a slightly too bright depth image (and problems in the bunny scene).												
901170	0	0	0																								
901196	0	0	0																								
913249	0	0	0																								
913333	0	0	0																								
913346	0	0	0																								
913566	15	15	0	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		R9: the depth and normal images are not necessarily created. You just need to check whether they are nullptrs like in the given starter code just above your commented lines.												
915221	0	0	0																								
915250	0	0	0																								
917863	14.5	14.5	0	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: you mixed the point light distance with the intensity.												
918150	0	0	0																								

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918228	13	13	0	0.5	1.5	0.5	1.5	2.5	1	1.5	1.5	1.5	1		R2: you are moving the center of the ray slightly in generateRay of perspective camera. This seems to cause your depth image to be slightly too bright. R4: dir_to_light is unnormalized with point lights -> way too bright images with point lights. R6: your intersection code is actually correct. The issue is the moving center of the ray. In R3 the movement is barely visible since the camera is so far away from the object - here we are much closer in world space and I think we are moving partially under the ground plane. R9: your JitteredSampler is what we were looking for the UniformSampler. We were looking for kind of a combination between Uniform and Regular samplers.												
918257	0	0	0																								
918309	0	0	0																								
918396	17.5	14	3.5	0.5	1.5	1	1.5	3	1	1.5	1.5	0.5	2		R8: test scene does not work at all. Code seems to exists, but is eaten by the refraction code?	2		1.5									
918464	14	14	0	0.5	1.5	0.5	1.5	2.5	1	1.5	1.5	1.5	2		R2: you don't seem to be ensuring that the value be [1,0]. R4: your point light attenuation is 1/dist?												
918671	20.5	15	5.5	0.5	1.5	1	1.5	3	1	1.5	1.5	1.5	2		fog was on for command line usage by default which took a while to realize. Refraction/fresnel quite broken. Looks like you are never adding the Poisson disk samples to old_samples, so this is really not that different from uniform sampling - idea is correct though. Transparent shadows: code looks reasonable but it is hard to confirm since refractions are not working properly to begin with.	1	1	1.5			1	0				1	Poisson-disk sampling.
918875	18	14.5	3.5	0.5	1.5	1	1.5	2.5	1	1.5	1.5	1.5	2		R4: you are taking contribution from light rays coming from under the local horizon.	2		1.5									
930484	3.5	3.5	0	0.5	1.5	1	0.5	0	0	0	0	0	0		R3: you had something resembling the right idea: no need to shift the origin of the ray, though!												
932440	6	6	0	0.5	1	1	1	2.5	0	0	0	0	0		R1+3: you have mixed up and horizontal directions, resulting in transposed images. R4: you are taking contribution from light rays coming from under the local horizon.												
935625	0	0	0																								

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939375	0	0	0																								
942618	14	11	3	0.5	1.5	0.5	1.5	3	1	1.5	1.5	0	0		Your camera ray is not normalized yielding slightly incorrect depth values + overly bright bunny.			3									
k28342	0	0	0																								