MT2 solutions CS314

1) F F T T F T F F T F F F F F 2pts each

2) L = CCS (clipping) or NDCS (normalized device)
M = VCS (viewing/camera/eye) ← 4pts each

3a) 13pts

to find
$l = A + N$ subtract $L - P$, normalize } 3pts

to find
$r = 2A + D$ $2N(N \cdot L) - L$
* OR 2A if you count $N \cdot L$ as already computed so no cost for D } 3pts
} do change between lights

to find
$V = A + N$ like l, subtract $V - P$ and normalize; does not change between lights, 1/3 if double counted } 3pts

$I_{tot} = I_j (k_d (n \cdot l)) + I_j (k_s (R \cdot V))^{shiny}$

(2pts over the first term, 1pt over the second)

$\to A + 2*(C \; A \; D + A + N \quad C \; A \; D + 2A + D \quad E) + (A + N)$

* (cost to add the two lights) +1 bonus point

$2*(C + A + D + A + N + C + A + 2A + D + D + E) + (A + N) + A$

$2(5A + 2C + 3D + E + N) + (A + N) + A$

$10A + 4C + 6D + 2E + 2N + A + N + A$

$12A + 4C + 6D + 2E + 3N$ also full credit for one less D and/or one less A

also correct if sum before multiplying: $I_j (x + y)$ → C + A (C for I_j, A for +)

instead of $I_j x + I_j y$ → 2C + A

3b) 6V 3/9 for 7V
9pts
one lighting calculation done for each face

3c) for each face, lighting calculation at all
9pts three vertices, then interpolate value for every pixel w/ barycentric coords

$\alpha A + \beta B + \gamma C$
$3A + 2A = 5A$

$(3 \cdot 6)V + F(3A + 2A)$
4pts → $18V + 5AF$ ← 5pts

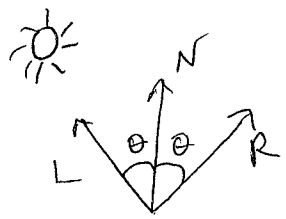
-2 for 7 instead of 18
-3 for AF not 5AF
-2 for summing 3 terms w/ 3A not 2A

3d) for each pixel, interpolate normal + normalize it +
9pts do lighting calculation

$F(V + 5A + N) = FV + 5AF + FN$
5pts 2pts 2pts

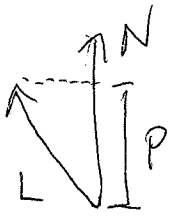
-2 if extra 7V

4)



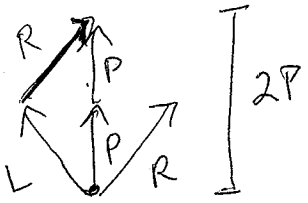
N is normal (normalized)

L is normalized vector to light



P is the projection of L onto N

$P = N(N \cdot L) = N(\cos\theta)$

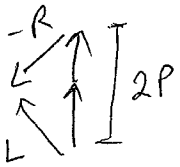


$R + L = 2P$, using parallelogram symmetry or vector addition

$R = 2P - L$

$= 2(N(N \cdot L)) - L$

double P and subtract R



3 pts know pieces

3 pts useful picture

6 pts projection

6 pts doubling

6 pts subtraction

missing exposition -4