

Quiz 5

This is a two-stage quiz. During the first stage, use your knowledge & calculator. You have 15 min. In the second stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have the remainder of the quiz time to write one solution (with everyone's name on it!!!) to be turned in for the group.

1. Consider the table below listing the Heat Index (I).

Table 1 Heat Index I As a Function of Temperature and Humidity

T \ H	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200
50	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200
55	52	57	62	67	72	77	82	87	92	97	102	107	112	117	122	127	132	137	142	147	152	157	162	167	172	177	182	187	192	197	202
60	54	59	64	69	74	79	84	89	94	99	104	109	114	119	124	129	134	139	144	149	154	159	164	169	174	179	184	189	194	199	204
65	56	61	66	71	76	81	86	91	96	101	106	111	116	121	126	131	136	141	146	151	156	161	166	171	176	181	186	191	196	201	206
70	58	63	68	73	78	83	88	93	98	103	108	113	118	123	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208
75	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210
80	62	67	72	77	82	87	92	97	102	107	112	117	122	127	132	137	142	147	152	157	162	167	172	177	182	187	192	197	202	207	212
85	64	69	74	79	84	89	94	99	104	109	114	119	124	129	134	139	144	149	154	159	164	169	174	179	184	189	194	199	204	209	214
90	66	71	76	81	86	91	96	101	106	111	116	121	126	131	136	141	146	151	156	161	166	171	176	181	186	191	196	201	206	211	216
95	68	73	78	83	88	93	98	103	108	113	118	123	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	213	218
100	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220

Relative humidity (%)

Actual temperature (°F)

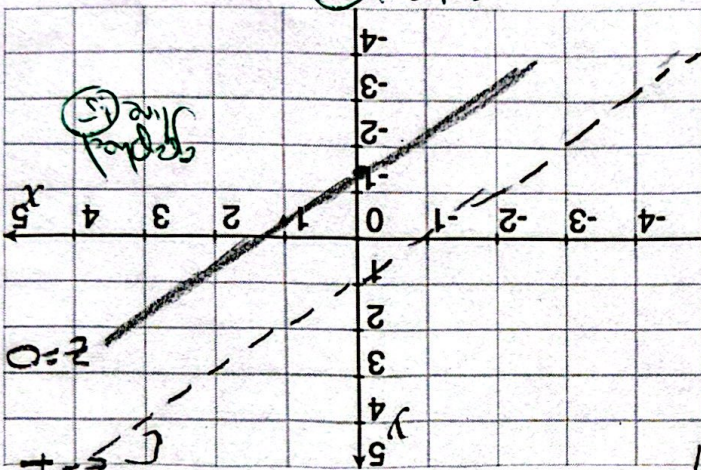
(a) [2] Is I a function of T and H? Why or why not?

(b) [2] Approximate $\frac{\partial I}{\partial T}$ at (96, 70).
[4] even (T, H) value corresponds to one (and only one) I value

$$\frac{\partial I}{\partial T} = \frac{133 - 96}{133 - 96} = \frac{37}{37} = 1$$

(a) [1] Find the domain for F.
need (x, y) so that $1+x-y \geq 0$ or $1+x \geq y$

(b) [3] Draw sections of the contour map/the level curves of F when $z = 1$ and $z = 0$. Label the curves!



$$\begin{cases} 1 = \cos(\sqrt{1+x-y}) \\ 0 = \sqrt{1+x-y} \end{cases} \Rightarrow y = 1+x$$

$$F_y(x, y) = \frac{\partial}{\partial y} (\cos(\sqrt{1+x-y})) = -\sin(\sqrt{1+x-y}) \cdot \frac{1}{2} \cdot (-1) = \frac{1}{2} \sin(\sqrt{1+x-y})$$

$$F_y(x, y) = \frac{1}{2} \sin(\sqrt{1+x-y})$$

Let $y = 1+x$

$$y = 1+x \Rightarrow (y-1)^2 = (x)^2 \Rightarrow y-1 = x \text{ or } y-1 = -x \Rightarrow y = x+1 \text{ or } y = 1-x$$

$$0 = \cos(\sqrt{1+x-y}) \Rightarrow \sqrt{1+x-y} = \frac{\pi}{2} \text{ or } \frac{3\pi}{2} \Rightarrow 1+x-y = \frac{\pi^2}{4} \text{ or } \frac{9\pi^2}{4}$$

Key