

Question	Input Code	Output	Explanation																																																																																																																																																																																																																																																								
1	<pre>def one_quest(track_id) : cursor.execute(""" SELECT tracks.artist_id, artists.artist_name, artist_term.term FROM tracks INNER JOIN artists ON tracks.artist_id = artists.artist_id INNER JOIN artist_term ON tracks.artist_id = artist_term.artist_id WHERE tracks.track_id =?""", track_id) return cursor.fetchall() track_id_1 = ('TRMMWLD128F9301BF2',) track_one = one_quest(track_id_1) one_df = pd.DataFrame(data = track_one, columns = ['artist_id', 'artist_name', 'term']) print_full(one_df)</pre>	<table> <thead> <tr> <th></th><th>artist_id</th><th>artist_name</th><th>term</th></tr> </thead> <tbody> <tr><td>0</td><td>ARE592P1187B99F3A7</td><td>Tone X</td><td>alternative rock</td></tr> <tr><td>1</td><td>ARE592P1187B99F3A7</td><td>Tone X</td><td>american</td></tr> <tr><td>2</td><td>ARE592P1187B99F3A7</td><td>Tone X</td><td>black gospel</td></tr> <tr><td>3</td><td>ARE592P1187B99F3A7</td><td>Tone X</td><td>black music</td></tr> <tr><td>4</td><td>ARE592P1187B99F3A7</td><td>Tone 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Question	Input Code	Output	Explanation
		61 ARE592P1187B99F3A7 Tonex urban 62 ARE592P1187B99F3A7 Tonéx alternative rock 63 ARE592P1187B99F3A7 Tonéx american 64 ARE592P1187B99F3A7 Tonéx black gospel 65 ARE592P1187B99F3A7 Tonéx black music 66 ARE592P1187B99F3A7 Tonéx christian 67 ARE592P1187B99F3A7 Tonéx contemporary christian 68 ARE592P1187B99F3A7 Tonéx contemporary gospel 69 ARE592P1187B99F3A7 Tonéx dance 70 ARE592P1187B99F3A7 Tonéx electronic 71 ARE592P1187B99F3A7 Tonéx funk 72 ARE592P1187B99F3A7 Tonéx funk soul 73 ARE592P1187B99F3A7 Tonéx gospel 74 ARE592P1187B99F3A7 Tonéx gospel jams 75 ARE592P1187B99F3A7 Tonéx gospel soul 76 ARE592P1187B99F3A7 Tonéx hip hop 77 ARE592P1187B99F3A7 Tonéx house 78 ARE592P1187B99F3A7 Tonéx jazz 79 ARE592P1187B99F3A7 Tonéx latin 80 ARE592P1187B99F3A7 Tonéx male vocalist 81 ARE592P1187B99F3A7 Tonéx pop 82 ARE592P1187B99F3A7 Tonéx r&b 83 ARE592P1187B99F3A7 Tonéx religious music 84 ARE592P1187B99F3A7 Tonéx rock 85 ARE592P1187B99F3A7 Tonéx salsa 86 ARE592P1187B99F3A7 Tonéx san diego 87 ARE592P1187B99F3A7 Tonéx smooth jazz 88 ARE592P1187B99F3A7 Tonéx soul 89 ARE592P1187B99F3A7 Tonéx syntax records 90 ARE592P1187B99F3A7 Tonéx techno 91 ARE592P1187B99F3A7 Tonéx united states 92 ARE592P1187B99F3A7 Tonéx urban	
2	<pre>duration = (3020,) cursor.execute('SELECT track_id FROM tracks WHERE duration >?', duration) durations = cursor.fetchall() print("track_ids with duration > 3020 are %d \n" %(duration[0])) two = pd.DataFrame(data = durations, columns = ['track_id > 3020']) print_full(two)</pre>	<pre>track_id > 3020 0 TRMTJMT128F93221B0 1 TRGASQU128F92D762F 2 TRGXALK12903D15504 3 TRHWGWD12903CD132B 4 TRB0GZY128F4269C26 5 TRQCLSM128F42944D9 6 TRQRHPV12903CB345A 7 TRZSL0D12903CF6FB5 8 TRPWUUP128F426B47B 9 TRPIWVS128F4289D7F 10 TRPJBMF128F9355E4C 11 TRTBHNV128F4245478 12 TRTBTAV128F4246BB2 13 TRUMEHU128F932D272 14 TRLOKWE12903CF205E 15 TRJOADI12903CC00F9 16 TRSMLI128F934C0A8 17 TRDZTTO12903CF1A2E 18 TR0ZPGU128F426FD26 19 TR0VFHS128F934D39D</pre>	N/A
3	<pre>start_end = (2010, 2014) cursor.execute(""" SELECT track_id FROM tracks WHERE year>= ? AND year <= ? ORDER BY duration ASC""", start_end) three = cursor.fetchmany(10) three_df = pd.DataFrame(data = three, columns = ['shortest duration track_id btw 2010 and 2014']) print_full(three_df)</pre>	<pre>shortest duration track_id btw 2010 and 2014 0 TRUJRNE12903CCE156 1 TRLMWPC12903D0EB6D 2 TRPMUA012903CBBEA3 3 TRTKXQG12903D06EA3 4 TRCERDU12903D03CF7 5 TRGVKMD12903CEB193 6 TRXWWHJ12903CAB222 7 TRVJQOT12903CEB184 8 TRADDAQ12903CBBEA4 9 TRUJCN12903D06E9F</pre>	N/A

Question	Input Code	Output	Explanation																																																															
4	<pre>cursor.execute(""" SELECT term, COUNT(term) FROM artist_term GROUP BY term ORDER BY COUNT(term) DESC""") four = cursor.fetchmany(20) four_df = pd.DataFrame(data = four, columns = ['term', 'term count']) print('The twenty most frequently used terms in descending order: \n', four_df)</pre>	<p>The twenty most frequently used terms in descending order:</p> <table><thead><tr><th></th><th>term</th><th>term count</th></tr></thead><tbody><tr><td>0</td><td>rock</td><td>23631</td></tr><tr><td>1</td><td>electronic</td><td>20797</td></tr><tr><td>2</td><td>pop</td><td>17025</td></tr><tr><td>3</td><td>alternative rock</td><td>13206</td></tr><tr><td>4</td><td>hip hop</td><td>11980</td></tr><tr><td>5</td><td>united states</td><td>11735</td></tr><tr><td>6</td><td>house</td><td>10352</td></tr><tr><td>7</td><td>jazz</td><td>10100</td></tr><tr><td>8</td><td>indie</td><td>9582</td></tr><tr><td>9</td><td>alternative</td><td>9545</td></tr><tr><td>10</td><td>electro</td><td>9488</td></tr><tr><td>11</td><td>experimental</td><td>8658</td></tr><tr><td>12</td><td>indie rock</td><td>8613</td></tr><tr><td>13</td><td>pop rock</td><td>8420</td></tr><tr><td>14</td><td>punk</td><td>8394</td></tr><tr><td>15</td><td>techno</td><td>8295</td></tr><tr><td>16</td><td>folk</td><td>7849</td></tr><tr><td>17</td><td>downtempo</td><td>7750</td></tr><tr><td>18</td><td>ambient</td><td>7130</td></tr><tr><td>19</td><td>soul</td><td>7127</td></tr></tbody></table>		term	term count	0	rock	23631	1	electronic	20797	2	pop	17025	3	alternative rock	13206	4	hip hop	11980	5	united states	11735	6	house	10352	7	jazz	10100	8	indie	9582	9	alternative	9545	10	electro	9488	11	experimental	8658	12	indie rock	8613	13	pop rock	8420	14	punk	8394	15	techno	8295	16	folk	7849	17	downtempo	7750	18	ambient	7130	19	soul	7127	N/A
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5	<pre>cursor.execute(""" SELECT artists.artist_name FROM tracks INNER JOIN artists ON tracks.artist_id = artists.artist_id WHERE tracks.duration = (SELECT MAX(tracks.duration) FROM tracks) """) five = cursor.fetchone() print("Artist name associated with longest duration: ", five[0])</pre>	Artist name associated with longest duration: Mystic Revelation of Rastafari	N/A																																																															
6	<pre>cursor.execute('SELECT AVG(duration) FROM tracks') print('Average duration of all tracks: ', cursor.fetchone()[0])</pre>	Average duration of all tracks: 249.71338394213936	N/A																																																															
7	<pre>cursor.execute(""" SELECT COUNT(track_id) FROM tracks LEFT JOIN artist_term ON tracks.artist_id = artist_term.artist_id WHERE artist_term.term is NULL""") print("# of tracks with null terms:", cursor.fetchone()[0])</pre>	# of tracks with null terms: 3710	N/A																																																															
8	<pre>min_time_one = 0 i = 0 for i in range(99) : start = time.clock() one_quest(track_id_1) finish = time.clock() duration = finish - start if min_time_one == 0 or duration < min_time_one : min_time_one = duration def eight_quest() : cursor.execute(""" CREATE INDEX eight_idx ON tracks (artist_id)""") return cursor.fetchone() start = time.clock() eight = eight_quest finish = time.clock() time_8 = finish - start print("1", min_time_one, "\n", "8 ", time_8) if min_time_one > time_8 : print("Question 1 min time takes %f more seconds than question 8 " %(min_time_one - time_8)) if time_8 > min_time_one : print("Question 8 min time takes %f more seconds than question 1 " %(time_8 - min_time_one))</pre>	<p>1 1.003107 8 1.9999999949504854e-06 Question 1 min time takes 1.003105 more seconds than question 8</p>	The minimum time for question 1 is 1.03 seconds. The time for creating the index is ~0 seconds. From this, one can conclude that constructing an index on artist_id is faster than completing the query from question 1.																																																															
9	<pre>cursor.execute(""" BEGIN TRANSACTION """) cursor.execute(""" DELETE FROM tracks WHERE track_id in (SELECT track_id FROM tracks INNER JOIN artist_term ON tracks.artist_id = artist_term.artist_id WHERE term = ?)""", ('eurovision winner',)) cursor.execute(""" ROLLBACK TRANSACTION""")</pre>	(No Output)	N/A																																																															