Product Analysis

1 – Product Launch Sales Analysis

Assignment: Pull trended sales metrics to evaluate the impact of new product launch:

```
-- Impact of New Product Launch
SELECT
    YEAR(s.created_at) AS yr,
    MONTH(s.created_at) AS mo, -- Yr & Mo - Dimensions
    -- COUNT(DISTINCT s.website_sessions_id) AS sessions,
    COUNT(DISTINCT o.order_id) AS orders,
    COUNT(DISTINCT o.order_id)/COUNT(DISTINCT s.website_session_id) AS conv_rate,
    SUM(o.price_usd)/COUNT(DISTINCT s.website_session_id) AS revenue_per_session,
    COUNT(DISTINCT CASE WHEN primary_product_id = 1 THEN o.order_id ELSE NULL END) AS product_one_orders,
    COUNT(DISTINCT CASE WHEN primary_product_id = 2 THEN o.order_id ELSE NULL END) AS product_two_orders
FROM website_sessions s
    LEFT JOIN orders o
        ON s.website_session_id = o.website_session_id
WHERE s.created_at < '2013-04-05' -- Date of assignment request
    AND s.created_at > '2012-04-01' -- specified in the request
GROUP BY 1,2;
```

yr	mo	orders	conv_rate	revenue_per_session	product_one_orders	product_two_orders
2012	4	99	0.0265	1.326101	99	0
2012	5	108	0.0289	1.445881	108	0
2012	6	140	0.0353	1.764205	140	0
2012	7	169	0.0398	1.990179	169	0
2012	8	228	0.0374	1.869092	228	0
2012	9	287	0.0439	2.192745	287	0
2012	10	371	0.0453	2.266718	371	0
2012	11	618	0.0441	2.203553	618	0
2012	12	506	0.0502	2.511412	506	0
2013	1	391	0.0611	3.127025	344	47
2013	2	497	0.0693	3.692108	335	162
2013	3	385	0.0615	3.178807	320	65
2013	4	96	0.0796	4.09539	82	14

- Despite the fact that April 2013 was a partial month, Product 2 started to generate sales since the launch on January 6th 2013.
- So far, Product 2 brought in most sales in February with 162 orders, reduced to 65 in March.
- The overall revenue per session increased greatly from 1.33 since the beginning to 3.69 in February and 3.18 in March 2013.
- The session to order conversion rate improved as well.
- In order to determine whether it's the new product launch caused the improvements or that was due to the overall business improvement, further analysis will be conducted.

2 – Product-Level Website Pathing

To gain understanding of how customers interact with each of the two products and how well each product converts customers.

Assignment: Use Website Pageviews table to identify after users viewed the multi-product showcase page (/products page), which specific products they clicked next; and calculate the view-to-order conversion rate for each specific product page.

```
-- Product-Level Website Pathing
SELECT
    wp.pageview_url,
    COUNT(DISTINCT wp.website_session_id) AS sessions,
    COUNT(DISTINCT order_id) AS orders,
    COUNT(DISTINCT order_id)/COUNT(DISTINCT wp.website_session_id) AS viewed_to_products_order_rate
FROM website_pageviews wp LEFT JOIN orders o
    ON wp.website_session_id = o.website_session_id
WHERE wp.created_at BETWEEN '2013-02-01' AND '2013-03-01' -- as requested
    AND wp.pageview_url IN ('/the-original-mr-fuzzy', '/the-forever-love-bear')
GROUP BY 1;
```

pageview_url	sessions	orders	viewed_to_products_order_rate
/the-forever-love-bear	815	162	0.1988
/the-original-mr-fuzzy	1988	335	0.1685

- For the time period specified, the 1st product (Mr. Fuzzy) had almost 2,000 sessions, more than doubled that of the new product with 815 sessions.
- Mr. Fuzzy also generated much more orders due to the fact that it was live much earlier.
- However, the new product was converting customers at almost 20% compared to nearly 17% for the first product. It appears that although the 2nd product (Forever Love Bear) had fewer sessions, for website visitors who did click to that specific product page, they were more likely to actually made a purchase.

3 – Product Portfolio Expansion

Assignment: The company has been in market for 3 years – dive deeper into the impact of introducing new products by pulling data to show:

- monthly sessions to the /products page,
- how the % of those sessions clicking through another page has changed over time, along with
- a view of how conversion from /products to placing an order has improved.

```sql
-- Product Portfolio Expansion
WITH t1 AS -- step 1: identify all the views of the '/products' page
(
  SELECT
      website_session_id,
      website_pageview_id,
      created_at AS saw_product_page_at
  FROM website_pageviews
  WHERE pageview_url = '/products'
) -- t1: products_pageviews temp table

SELECT
    YEAR(saw_product_page_at) AS yr,
    MONTH(saw_product_page_at) AS mo,
    COUNT(DISTINCT t1.website_session_id) AS sessions_to_product_page,
    COUNT(DISTINCT pv.website_session_id) AS clicked_to_next_page,
    COUNT(DISTINCT pv.website_session_id)/COUNT(DISTINCT t1.website_session_id) AS clickthrough_rate,
    COUNT(DISTINCT o.order_id) AS orders,
    COUNT(DISTINCT o.order_id)/COUNT(DISTINCT t1.website_session_id) AS products_to_order_rate
FROM t1
  LEFT JOIN website_pageviews pv
    ON t1.website_session_id = pv.website_session_id -- same session
    AND pv.website_pageview_id > t1.website_pageview_id -- they had another pageview After /products
  LEFT JOIN orders o
    ON o.website_session_id = t1.website_session_id
GROUP BY 1,2
```

yr	mo	sessions_to_product_page	clicked_to_next_page	clickthrough_rate	orders	products_to_order_rate
2012	3	741	529	0.7139	60	0.0810
2012	4	1447	1028	0.7104	99	0.0684
2012	5	1584	1135	0.7165	108	0.0682
2012	6	1752	1247	0.7118	140	0.0799
2012	7	2019	1440	0.7132	169	0.0837
2012	8	3011	2197	0.7297	228	0.0757
2012	9	3125	2256	0.7219	287	0.0918
2012	10	4031	2950	0.7318	371	0.0920
2012	11	6745	4850	0.7191	618	0.0916
2012	12	5013	3620	0.7221	506	0.1009
2013	1	3380	2595	0.7678	391	0.1157
2013	2	3685	2803	0.7607	497	0.1349
2013	3	3369	2574	0.7640	385	0.1143
2013	4	4362	3356	0.7694	552	0.1265
2013	5	4680	3606	0.7705	571	0.1220
2013	6	4598	3534	0.7686	594	0.1292
2013	7	5022	3892	0.7750	603	0.1201
2013	8	5229	3953	0.7560	608	0.1163
2013	9	5396	4070	0.7543	630	0.1168
2013	10	6042	4568	0.7560	708	0.1172
2013	11	7888	5901	0.7481	861	0.1092
2013	12	8840	7026	0.7948	1047	0.1184
2014	1	7790	6387	0.8199	983	0.1262
2014	2	7960	6485	0.8147	1021	0.1283
2014	3	8100	6661	0.8223	1064	0.1314
2014	4	9743	7956	0.8166	1241	0.1274
2014	5	10264	8468	0.8250	1368	0.1333
2014	6	10005	8256	0.8252	1239	0.1238
2014	7	10834	8953	0.8264	1282	0.1183
2014	8	10775	8988	0.8342	1330	0.1234
2014	9	11127	9154	0.8227	1424	0.1280
2014	10	12341	10242	0.8299	1609	0.1304
2014	11	14481	12023	0.8303	1985	0.1371
2014	12	17240	14609	0.8474	2314	0.1342
2015	1	15217	12992	0.8538	2099	0.1379
2015	2	14373	12187	0.8479	2067	0.1438
2015	3	9022	7723	0.8560	1254	0.1390

- Steady increase for the sessions to /products page in general.
- The CTR for users clicked from the multi-product showcase page to another page improved from 71% since the beginning to around 85% in the most recent months of the task.
- The CVR for people seeing the /products page and then converting to a paid customer has gone up from around 7% ~ 8% to 14%.
- In general, adding more products helped to contribute the health of the business.

4 – Cross-Sell & Product Portfolio Analysis

Gain an understanding of which products are most likely to purchase together in order to offer smart product recommendations to boost sales and revenue.

Assignment: The 4th product was made available as a primary product on December 5th 2014 (it was previously only a cross-sell product). Pull sales data since then and show how well each product cross-sells from one another.

```sql
-- Cross-Sell & Product Portfolio Analysis
WITH t1 AS -- t1 (primary_products)
(
  SELECT
      order_id,
      primary_product_id,
      created_at AS ordered_at
  FROM orders
  WHERE created_at > '2014-12-05' -- when the 4th product was added
),

t2 AS  -- t2 (primary_w_cross_sell)
(
  SELECT
      t1.*,
      oi.product_id AS cross_sell_product_id
  FROM t1 LEFT JOIN order_items oi
    ON t1.order_id = oi.order_id
    AND oi.is_primary_item = 0)  -- only bringing in cross-sells

SELECT primary_product_id,  -- step 3
      COUNT(DISTINCT order_id) AS total_orders,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 1 THEN order_id ELSE NULL END) AS _xsold_p1,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 2 THEN order_id ELSE NULL END) AS _xsold_p2,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 3 THEN order_id ELSE NULL END) AS _xsold_p3,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 4 THEN order_id ELSE NULL END) AS _xsold_p4,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 1 THEN order_id ELSE NULL END)/COUNT(DISTINCT order_id) AS p1_xsell_rt,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 2 THEN order_id ELSE NULL END)/COUNT(DISTINCT order_id) AS p2_xsell_rt,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 3 THEN order_id ELSE NULL END)/COUNT(DISTINCT order_id) AS p3_xsell_rt,
      COUNT(DISTINCT CASE WHEN cross_sell_product_id = 4 THEN order_id ELSE NULL END)/COUNT(DISTINCT order_id) AS p4_xsell_rt
FROM t2
GROUP BY 1;
```

primary_product_id	total_orders	_xsold_p1	_xsold_p2	_xsold_p3	_xsold_p4	p1_xsell_rt	p2_xsell_rt	p3_xsell_rt	p4_xsell_rt
1	4467	0	238	553	933	0.00%	5.33%	**12.38%**	**20.89%**
2	1277	25	0	40	260	1.96%	0.00%	3.13%	**20.36%**
3	929	84	40	0	208	**9.04%**	4.31%	0.00%	**22.39%**
4	581	16	9	22	0	2.75%	1.55%	3.79%	0.00%

- Product 1 and Product 2 were still the biggest sales driver in terms of total orders.
- Product 4 was the best cross-sell products for all of the other products, above 20% of the orders for Product 1, 2, and 3 as the primary product ended up purchasing Product 4 as well.
- Product 1 and Product 3 cross sell pretty well for each other.

5 – Product Refund Analysis

Product quality control by analyzing product refund rate.

```
-- Product Refund Analysis
SELECT -- monthly product refund rates by product
    YEAR(i.created_at) AS yr,
    MONTH(i.created_at) AS mo, -- Dimensions year and month
    COUNT(DISTINCT CASE WHEN product_id = 1 THEN i.order_item_id ELSE NULL END) AS p1_orders,
    COUNT(DISTINCT CASE WHEN product_id = 1 THEN r.order_item_refund_id ELSE NULL END)
      /COUNT(DISTINCT CASE WHEN product_id = 1 THEN i.order_item_id ELSE NULL END) AS p1_refund_rt,
    COUNT(DISTINCT CASE WHEN product_id = 2 THEN i.order_item_id ELSE NULL END) AS p2_orders,
    COUNT(DISTINCT CASE WHEN product_id = 2 THEN r.order_item_refund_id ELSE NULL END)
      /COUNT(DISTINCT CASE WHEN product_id = 2 THEN i.order_item_id ELSE NULL END) AS p2_refund_rt,
    COUNT(DISTINCT CASE WHEN product_id = 3 THEN i.order_item_id ELSE NULL END) AS p3_orders,
    COUNT(DISTINCT CASE WHEN product_id = 3 THEN r.order_item_refund_id ELSE NULL END)
      /COUNT(DISTINCT CASE WHEN product_id = 3 THEN i.order_item_id ELSE NULL END) AS p3_refund_rt,
    COUNT(DISTINCT CASE WHEN product_id = 4 THEN i.order_item_id ELSE NULL END) AS p4_orders,
    COUNT(DISTINCT CASE WHEN product_id = 4 THEN r.order_item_refund_id ELSE NULL END)
      /COUNT(DISTINCT CASE WHEN product_id = 4 THEN i.order_item_id ELSE NULL END) AS p4_refund_rt
FROM order_items i -- start with order_items - which item was purchased
  LEFT JOIN order_item_refunds r -- figure out which of the items were refunded
    ON i.order_item_id = r.order_item_id
WHERE i.created_at < '2014-10-15' -- date of assignment
GROUP BY 1,2;
```

yr	mo	p1_orders	p1_refund_rt	p2_orders	p2_refund_rt	p3_orders	p3_refund_rt	p4_orders	p4_refund_rt
2012	3	60	**0.0167**	0	NULL	0	NULL	0	NULL
2012	4	99	**0.0505**	0	NULL	0	NULL	0	NULL
2012	5	107	**0.0374**	0	NULL	0	NULL	0	NULL
2012	6	141	**0.0567**	0	NULL	0	NULL	0	NULL
2012	7	169	**0.0828**	0	NULL	0	NULL	0	NULL
2012	8	228	**0.0746**	0	NULL	0	NULL	0	NULL
2012	9	287	**0.0906**	0	NULL	0	NULL	0	NULL
2012	10	371	**0.0728**	0	NULL	0	NULL	0	NULL
2012	11	618	**0.0744**	0	NULL	0	NULL	0	NULL
2012	12	506	**0.0593**	0	NULL	0	NULL	0	NULL
2013	1	343	**0.0496**	47	0.0213	0	NULL	0	NULL
2013	2	336	**0.0714**	162	0.0123	0	NULL	0	NULL
2013	3	320	**0.0563**	65	0.0462	0	NULL	0	NULL
2013	4	459	**0.0414**	93	0.0108	0	NULL	0	NULL
2013	5	489	**0.0634**	82	0.0244	0	NULL	0	NULL
2013	6	503	**0.0775**	91	0.0549	0	NULL	0	NULL
2013	7	508	**0.0728**	95	0.0316	0	NULL	0	NULL
2013	8	510	**0.0549**	98	0.0102	0	NULL	0	NULL
2013	9	538	**0.0428**	98	0.0102	0	NULL	0	NULL
2013	10	603	**0.0282**	135	0.0148	0	NULL	0	NULL
2013	11	724	**0.0345**	174	0.0230	0	NULL	0	NULL
2013	12	818	**0.0232**	183	0.0219	139	0.0719	0	NULL
2014	1	728	**0.0426**	183	0.0219	200	0.0650	0	NULL
2014	2	584	**0.0394**	351	0.0171	211	0.0664	202	0.0099
2014	3	784	**0.0306**	192	0.0156	244	0.0697	205	0.0049
2014	4	917	**0.0349**	215	0.0186	267	0.0674	259	0.0154
2014	5	1031	**0.0291**	246	0.0163	298	0.0570	297	0.0067
2014	6	892	**0.0572**	245	0.0367	289	0.0554	250	0.0240
2014	7	959	**0.0438**	242	0.0372	275	0.0400	260	0.0154
2014	8	961	**0.1374**	239	0.0167	295	0.0678	307	0.0065
2014	9	1056	**0.1326**	250	0.0320	317	0.0662	327	0.0122
2014	10	511	**0.0274**	136	0.0074	164	0.0488	154	0.0325

- Product 1 had some qualities issues with relatively high refund rate. The company replaced the previous supplier to address the issue and which has been corrected since October 2014.