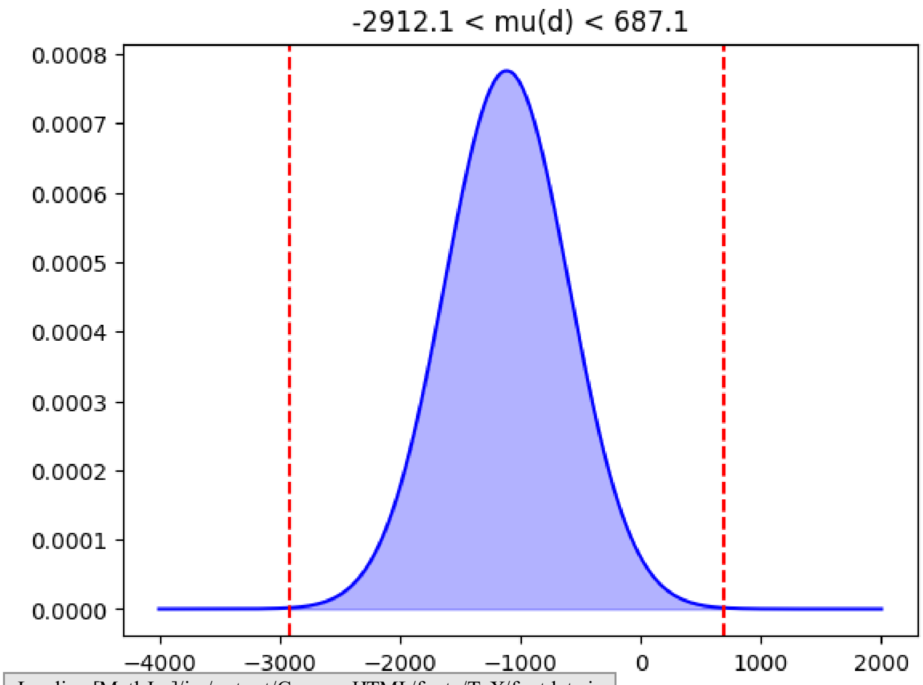
In [4]:

```
# 연습문제 6 p245, node (21)
import numpy as np
from scipy import stats

data = [[1, 34400, 36700], [2, 45500, 46800], [3, 36700, 37700], [4, 32000, 31100], [5, 48400, 47800], [6, 32800, 36400], [7, 38100, 3890

differences = [row[1] - row[2] for row in data]
d_mean = np.mean(differences)
s = np.std(differences, ddof=1)
sem = s / np.sqrt(len(differences))
t_value = stats.t.ppf((1 + 0.99) / 2, len(differences) - 1)
margin_of_error = t_value * sem

ci_lower = d_mean - margin_of_error
ci_upper = d_mean + margin_of_error

print(f'mu(d) 의 99% 신뢰구간 : ({round((ci_lower), 1)}km < mu(d) < {round((ci_upper), 1)}km)')
```

```
mu(d) 의 99% 신뢰구간 : (-2912.1km < mu(d) < 687.1km)
```

In [7]:

```
# 연습문제 6 p245, node (21) + 시각화
import matplotlib.pyplot as plt
import numpy as np

x = np.linspace(-4000, 2000, 1000)

data = [[1, 34400, 36700], [2, 45500, 46800], [3, 36700, 37700], [4, 32000, 31100], [5, 48400, 47800], [6, 32800, 36400], [7, 38100, 3890

differences = [row[1] - row[2] for row in data]

d_mean = np.mean(differences)
s = np.std(differences, ddof=1)

sem = s / np.sqrt(len(differences))

pdf = (1 / (sem * np.sqrt(2 * np.pi))) * np.exp(-0.5 * ((x - d_mean) / sem) ** 2)

plt.plot(x, pdf, color='blue')
plt.axvline(-2912.1, color="red", linestyle="--")
plt.axvline(687.1, color="red", linestyle="--")
plt.fill_between(x, pdf, where=(x > -2912.1) & (x < 687.1), color='blue', alpha=0.3)

plt.title('-2912.1 < mu(d) < 687.1')
plt.show()
```


-2912.1 < mu(d) < 687.1
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
−4000
−3000
−2000
−1000
0
1000
2000