```c
void prefun_16(__m512 *f, __m512 *fd, __m512 p,
               __m512 dk, __m512 pk, __m512 ck,
               __mmask16 m)
{
    __m512 pratio, ak, bkp, ppk, qrt;
    __mmask16 cond, ncond;

    // Conditions.
    cond = _mm512_mask_cmp_ps_mask(m, p, pk, _MM_CMPINT_LE);
    ncond = m & ~cond;

    // The first branch.
    if (cond != 0x0)
    {
        pratio = _mm512_mask_div_ps(z, cond, p, pk);
        *f = _mm512_mask_mul_ps(*f, cond, MUL(g4, ck),
                SUB(_mm512_mask_pow_ps(z, cond, pratio, g1), one));
        *fd = _mm512_mask_div_ps(*fd, cond,
                _mm512_mask_pow_ps(z, cond, pratio, SUB(z, g2)),
                MUL(dk, ck));
    }

    // The second branch.
    if (ncond != 0x0)
    {
        ak = _mm512_mask_div_ps(z, ncond, g5, dk);
        bkp = FMADD(g6, pk, p);
        ppk = SUB(p, pk);
        qrt = _mm512_mask_sqrt_ps(z, ncond,
                                  _mm512_mask_div_ps(z, ncond, ak, bkp));
        *f = _mm512_mask_mul_ps(*f, ncond, ppk, qrt);
        *fd = _mm512_mask_mul_ps(*fd, ncond, qrt,
                FNMADD(_mm512_mask_div_ps(z, ncond, ppk, bkp),
                        SET1(0.5), one));
    }
}
```