**Instructions:** Each group is assigned one problem. Within each group, you may work in teams but each of you must write and submit your own solutions. Violators may be penalized up to the maximum credit for the assignment. You must turn in your solutions as a scanned copy via email to `amriksen@thapar.edu` by 9 pm of May 3, 2020. Maximum credit for this assignment is five points.

1. **Group 1:**
   Apply *residue calculus* to compute $\oint_C \frac{e^{3z}}{(z-2)(z-4)}dz$ where $C : |z| = 3$.

2. **Group 2:**
   $f(z) := \frac{e^{3z}}{(z-2)(z-4)}$. Identify the poles of $f(z)$ and find the residue of $f(z)$ in each case.

3. **Group 3:**
   $g(z) := \frac{e^{3z}}{(z-2)^2}$. identify the poles and find the residue of $g(z)$ at the poles. Also write $g(z)$ in terms of an appropriate power series.

4. **Group 4:**
   Find the residue of the function $h(z) := \frac{e^{az}}{z^4+1}$ at the poles. Also identify the poles of $h(z)$.

5. **Group 5:**
   Use *residue calculus* to compute $\oint_\gamma \frac{z^5-2z^4+2z-6}{z^2-2z}dz$ where $\gamma$ is the closed curve defined by $z(\theta) = \left(2 + \cos\frac{\theta}{2}\right)e^{i\theta},\ 0 \le \theta \le 4\pi$.

6. **Group 6:**
   Identify the poles and find the corresponding residues of the function $k(z) := \frac{\pi \cot \pi z}{z^2}$ at the poles.

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