Homework 7 - Math 142 **Name:** _____

Due by 5:00pm Friday, October 9. Send a PDF with your solutions to `blins@hsc.edu`.

1. Find $\displaystyle\int_0^\infty x^2 e^{-2x}\,dx$.

---

2. For each of the following, find a smaller integral that diverges.

   (a) $\displaystyle\int_0^1 \frac{e^x}{x^2}\,dx$

   (b) $\displaystyle\int_1^\infty \sqrt{\ln x}\,dx$

---

3. For each of the following, find a larger integral that converges.

   (a) $\displaystyle\int_0^\infty e^{-x}\sin^2 x\,dx$

   (b) $\displaystyle\int_0^\infty \frac{\sqrt{x}}{1+x^2}\,dx$

---

4. Find the volume of the region under $y = (\sin x)(\sqrt{\cos x})$ from $x = 0$ to $x = \frac{\pi}{2}$ when it is revolved around the x-axis.

---

5. Find the volume of the region under the curve $y = \dfrac{1}{x}$ from $x = 1$ to $x = 2$ when it is revolved around the x-axis.
