AMATH 353: Homework 8
Due May, 2 2018
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Part 1 We are asked to compute the integral $\int_a^b x \cos(\frac{n\pi x}{2})$. I will also show my work here for $\int_a^b (2-x) \cos(\frac{n\pi x}{2})$ as this is how I computed the a_n term later on. Starting with the first one, using division by parts we have:

$$\int x \cos(\frac{n\pi x}{2}) = \int u \, dv$$
$$u = x \ , \ du = dx$$
$$dv = \cos(\frac{n\pi x}{2})$$
$$v = \int dv = \frac{2}{n\pi} \sin(\frac{n\pi x}{2})$$
$$\int u \, dv = uv - \int v \, du = \frac{2x}{n\pi} \sin(\frac{n\pi x}{2}) + \frac{4}{n^2\pi^2} \cos(\frac{n\pi x}{2}) \tag{1}$$

$$\int_a^b x \cos(\frac{n\pi x}{2}) =$$
$$\frac{2b}{n\pi} \sin(\frac{n\pi b}{2}) + \frac{4}{n^2\pi^2} \cos(\frac{n\pi b}{2}) - \frac{2a}{n\pi} \sin(\frac{n\pi a}{2}) - \frac{4}{n^2\pi^2} \cos(\frac{n\pi a}{2}) \tag{2}$$

bla