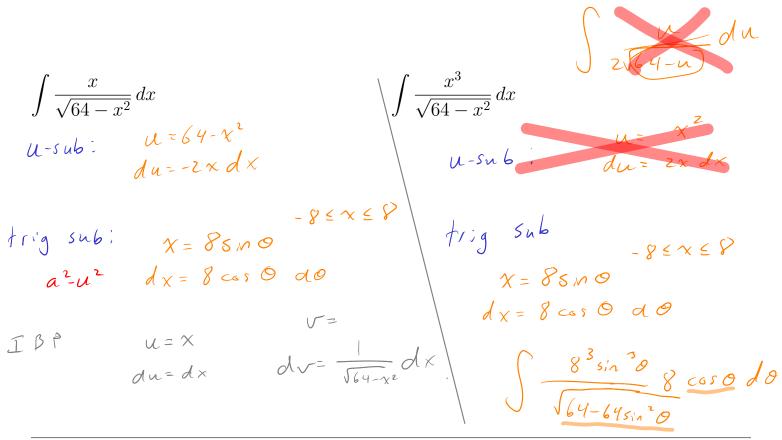
8.6: Integration Strategies

Example. What integration methods can be used to evaluate the functions below? (No need to evaluate the integral)

$$\int \frac{1}{1-x^2} dx \qquad u = \frac{1}{2x} dx$$

$$PFP : \frac{1}{1-x^2} = \frac{A}{1+x} + \frac{B}{1-x}$$



Example. Identify two integration techniques which can be used to evaluate

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$$\mathcal{U}$$
—subspace \mathcal{U} and \mathcal{U} $\mathcal{U$

0= sec (2) -2 LX (2

u-sub:
$$u = x^3 - 4x$$

$$du = 3x^2 - 4 dx \rightarrow -du = 4 - 3x^2 dx$$

Example. Perform a substitution of variables to rewrite $\int x \sin(\sqrt{x}) dx$. Let t= Jx $dt = \frac{1}{2\sqrt{5x}} dx \Rightarrow 2dt = \frac{1}{\sqrt{5x}} dx = \frac{1}{\sqrt{5x}} \frac{1}{\sqrt$ $= \int zt^3 sm(t) dt$

$$u = 2t^{3}$$

$$du = 6t^{2} dt \qquad dv = sin(t) dt$$

Example.
$$\int_{1}^{3} \frac{\tan^{-1}(\sqrt{x})}{x^{1/2} + x^{3/2}} dx$$

$$= \int_{1}^{3} \frac{\tan^{-1}(\sqrt{x})}{\sqrt{x}(1+x)} dx$$

$$=2\int_{1}^{\sqrt{3}}\frac{\tan^{-1}(u)}{\left(1+u^{2}\right)}du$$

$$= 2 \int_{11/4}^{11/3} \sqrt{dv}$$

$$=\frac{2V^2}{2}\bigg|_{T/4}^{T/3}=\frac{\sqrt{17}}{3}\bigg|_{T/4}^2=\frac{7\pi^2}{144}$$

$$u = x^{1/2}$$

$$du = \frac{1}{2\sqrt{x}} dx$$

$$\chi = 1, u = 1$$

$$\chi = 3, u = \sqrt{3}$$

$$V = \tan^{-1}(u)$$

$$dv^{2} = \frac{1}{1+u^{2}} du$$

$$u=1, \ v=\frac{\pi}{4}$$
 $u=53, \ v=\frac{\pi}{3}$

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