

No notes or calculators. Show all work.

1. (4 points) Find the indefinite integral.

$$\int \frac{x}{\sqrt{1-x^2}} dx$$

$$u = 1 - x^2$$

$$du = -2x dx$$

$$\rightarrow -\frac{1}{2} du = x dx$$

$$= \int \frac{1}{\sqrt{1-x^2}} \cdot x dx$$

$$= \int \frac{1}{\sqrt{u}} \cdot \left(-\frac{1}{2}\right) du$$

$$= -\frac{1}{2} \int u^{-1/2} du = -\frac{1}{2} \frac{u^{1/2}}{1/2} + C = \boxed{- (1-x^2)^{1/2} + C}$$

2. (6 points) Evaluate the definite integral. You may leave your answer unsimplified.

$$\int_0^1 3xe^{x^2} dx$$

$$u = x^2$$

$$du = 2x dx$$

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

$$= 3 \int_0^1 e^{x^2} \cdot x dx$$

$$= 3 \int_0^1 e^u \cdot \frac{1}{2} du$$

$$= \frac{3}{2} e^u \Big|_0^1 = \frac{3}{2} e^{x^2} \Big|_0^1 = \boxed{\frac{3}{2} e^1 - \frac{3}{2} e^0}$$

$$\text{or } \frac{3}{2} (e^1 - 1)$$