

Name: ANSWERS

Instructions: No calculators! Answer all problems in the space provided!

1. Compute the following derivatives:

(a)  $\frac{d}{dx} 2 \tan 3x = \underline{6 \sec^2 3x}$  (b)  $\frac{d}{dx} \frac{3}{(1+x^2)^3} = \underline{\frac{-18x}{(1+x^2)^4}}$   
 (c)  $\frac{d}{dx} (x \ln x - x) = \underline{\ln x}$  (d)  $\frac{d}{dx} 5yz(x^2 + 1)^3 = \underline{30xyz(x^2 + 1)^2}$

2. Evaluate the following integrals:

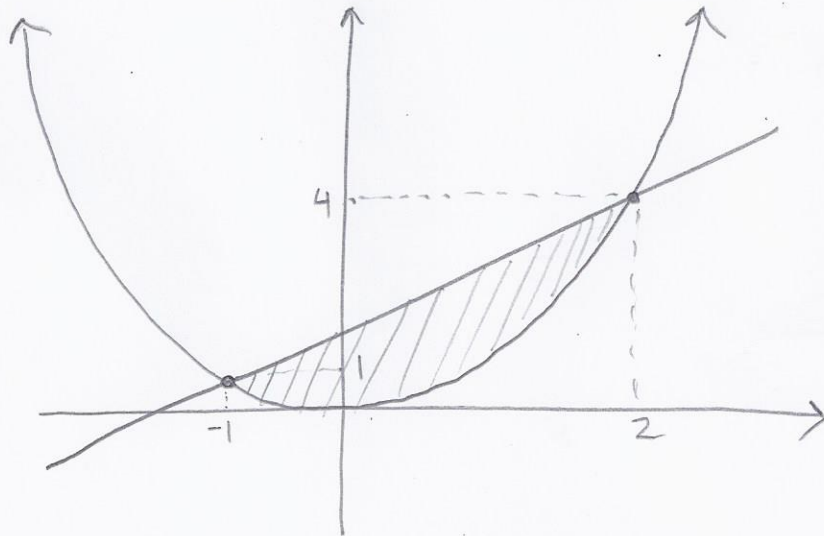
(a)  $\int \sin^2 x dx = \underline{\frac{1}{2}(x - \frac{1}{2} \sin 2x) + C}$  (b)  $\int x^2 e^x dx = \underline{x^2 e^x - 2x e^x + 2e^x + C}$   
 (c)  $\int \cos^3 x \sin^2 x dx = \underline{\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C}$  (b)  $\int \frac{3r}{\sqrt{1-r^2}} dr = \underline{-3\sqrt{1-r^2} + C}$

3. Complete the following polar coordinate formulas:

(a)  $x = \underline{r \cos \theta}$  (b)  $y = \underline{r \sin \theta}$  (c)  $r^2 = \underline{x^2 + y^2}$

4. Sketch the region bounded by  $y = x^2$  and  $y = x + 2$ . Find the intersecting points and identify them on your sketch. Shade the enclosed region.

$x^2 = x + 2$   
 $x^2 - x - 2 = 0$   
 $(x - 2)(x + 1) = 0$   
 $x = 2, x = -1$   
 $(2, 4), (-1, 1)$



5. Draw a rectangular box and a sphere. For the sphere, indicate the radius, center and equator on your sketch.

