Books, notes (in any form), and calculators are not allowed. *Show all your work.* Good Luck!

1. (4 pts) Find an equation of the tangent line to $y = \sqrt{2x+1}$ at $x = 4$.

2. (3 pts) Find the derivative of $y = \sin^3(1 + 4\theta^2)$.

3. (5 pts) Find dy/dx by implicit differentiation.

$$x^2 y^3 - 3y = \tan(y) + \cos(x)$$

4. (3 pts) Newton's Law of Gravitation says that the magnitude F of the force exerted by a body of mass m on a body of mass M is

$$F = \frac{GmM}{r^2} \qquad \text{where } G \text{ is the gravitational constant and } r \text{ is the distance between the two bodies.}$$

Find $\dfrac{dF}{dr}$ and (in one sentence) explain its meaning.