Work the following on **notebook paper**. **No calculator.** (Not all problems will require u-sub.)

1. $\int x\sqrt{x+3}\,dx$

8. $\int \dfrac{1}{3x+4}\,dx$

2. $\int_{1}^{2} 2x^2\sqrt{x^3+1}\,dx$

9. $\int \sin x\, e^{\cos x}\,dx$

3. $\int_{\pi/15}^{\pi/10} \cos(5x)\,dx$

10. $\int_{e}^{e^2} \dfrac{(\ln x)^4}{x}\,dx$

4. $\int x^2\sqrt{x-5}\,dx$

11. $\int \dfrac{e^{2x}}{1+e^{2x}}\,dx$

5. $\int \dfrac{x}{\sqrt[3]{x+5}}\,dx$

12. $\int \tan(3x)\,dx$

6. $\int_{1}^{2} \dfrac{5x^3-4x^2+7}{x^2}\,dx$

13. $\int 5\sec(3x)\,dx$

7. $\int_{0}^{5} |3x-6|\,dx$

14. $\int \dfrac{\sec^2(3x)}{\tan(3x)}\,dx$

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Solve the differential equation.

15. $f''(x)=3x^2,\ f'(0)=5,\ f(0)=-2$

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Find the derivative. Do not leave complex fractions or negative exponents in your answers.

16. $y=\dfrac{x^3}{\sec x}$

17. $y=\sin^3(x^7)$

18. If $f(x)=\sqrt{x-1}$, find $\left(f^{-1}\right)'(3)$.

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19. Find the particular solution of the differential equation that satisfies the initial conditions.

$$f''(x)=\cos x+e^{5x},\ \ f(0)=\dfrac{4}{25},\ \ f'(0)=\dfrac{3}{5}$$

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20. The acceleration of a particle moving along the x-axis at time t is given by $a(t)=6t-2$. If the

velocity is 25 when $t=3$ and the position is 10 when $t=1$, then the position $x(t)=$

(A) $9t^2+1$ (B) $3t^2-2t+4$ (C) t^3-t^2+4t+6

(D) $t^3-t^2+9t-20$ (E) $36t^3-4t^2-77t+55$