Name: Key _____ _____ / 25

Please circle your instructor's name: Kevin Meek James Gossell Margaret Short

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[3 points]** For the function $F(x) = \int_3^{x^2} \sqrt{t}\, dt$, use the Fundamental Theorem of Calculus to find $F'(x)$.

$F'(x) = \sqrt{x^2} \cdot 2x$

2. **[9 points]** Evaluate the definite integrals below. Use proper notation and simplify your answers.

a. $\int_0^2 (3e^x + 2)\, dx$ $= \left[3e^x + 2x\right]_0^2 = 3e^2 + 4 - (3e^0 + 0) = 3e^2 + 4 - 3$

$= \boxed{3e^2 + 1}$

b. $\int_1^3 t(t-2)\, dt$ $= \int_1^3 (t^2 - 2t)\, dt = \left[\frac{1}{3}t^3 - t^2\right]_1^3 = \left(\frac{1}{3}(3)^3 - 3^2\right) - \left(\frac{1}{3} - 1\right)$

$= 9 - 9 - \frac{1}{3} + 1 = \boxed{\frac{2}{3}}$

c. $\int_0^\pi (2\sin(x) + 3\cos(x))\, dx$ $= \left[-2\cos x + 3\sin x\right]_0^\pi = -2\cos\pi + 3\sin\pi - (-2\cos 0 + 3\sin 0)$

$= -2(-1) + 0 + 2(1) + 0 = \boxed{4}$

3. [8 points] Evaluate the following indefinite integrals (antiderivatives) below. Clearly state any substitutions you use and write your final answer in terms of x.

a. $\int \frac{\sin(\ln(x))}{x}\,dx$ $= \int \sin(u)\,du = -\cos(u) + C = \boxed{-\cos(\ln x) + C}$

Let $u = \ln x$

$du = \frac{1}{x}\,dx$

b. $\int \frac{-3x^2 + \sin(x)}{x^3 + \cos(x)}\,dx$ $= \int \frac{-du}{u} = \boxed{-\ln|u| + C}$

not finished, oops

$= \boxed{-\ln|x^3 + \cos x| + C}$

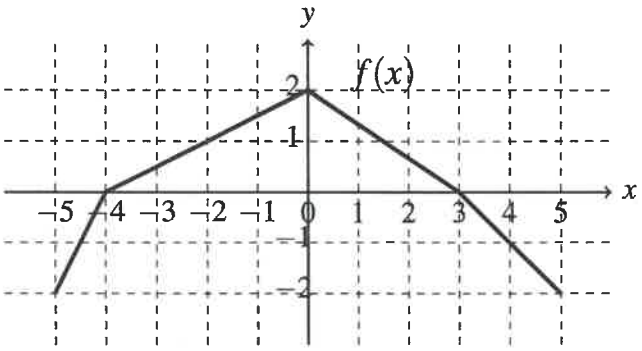
final answer!

Let $u = x^3 + \cos x$

$du = (3x^2 - \sin x)\,dx$

$-du = (-3x^2 + \sin x)\,dx$

4. [5 points] Use the graph of $f(x)$ (below) to answer questions about $A(x) = \int_{-5}^{x} f(t)\,dt$.



a. $A(-2) =$ 0

b. $A(4) =$ 5.5

c. $A'(0) =$ 2

d. On the interval $[-5,5]$, where does $A(x)$ have a maximum or minimum?

Maximum at $x =$ 3

Minimum at $x =$ -4