

Name _____

Student number _____

Each part of each problem is worth one point, for a total of ten points. There is no partial credit. You have twenty-five minutes for this test. If you find a problem takes more than a minute or two, move on to something else and come back to it later.

1. Put $\sin(2t) + \sqrt{3}\cos(2t)$ in the form $A\sin(Bt + C)$. Recall that $\sin(\theta + \phi) = \sin(\theta)\cos(\phi) + \cos(\theta)\sin(\phi)$. It may also be useful to remember that a $30^\circ - 60^\circ - 90^\circ$ triangle has sides 1, $\sqrt{3}$, and 2 (though in your formula all angles must be in radians).

$$2\sin\left(2t + \frac{\pi}{3}\right)$$

2. Solve the following expression for y : $\ln(xy) - \ln(x^2) = x + 3$, where $x > 0$ and $y > 0$.

$$y = xe^{x+3}$$

3. Simplify the following expression: $\frac{\frac{B+A}{AB}}{\frac{B}{A} - \frac{A}{B}}$, where A, B are non-zero real numbers.

$$\frac{1}{B - A}$$

4. Find all values of x for which $x^3 - 5x^2 + 6x = 0$

$$x = 0, 2, \text{ or } 3$$

5. Find all values of x for which $x^2 + 5x - 6 = 0$

$$x = 1 \text{ or } -6$$

6. $\int 2xe^{x^2} dx = e^{x^2} + C$

7. $\int 2xe^{2x} dx = xe^{2x} - \frac{1}{2}e^{2x} + C$

8. $\int \frac{x}{x+1} dx = x - \ln|x+1| + C$

9. $\int \frac{1}{x^2+1} dx = \tan^{-1}(x) + C$

10. $\int \frac{1}{x^2-1} dx = \frac{1}{2}\ln|x-1| - \frac{1}{2}\ln|x+1| + C$